DOCUMENT RESUME

ED 033 759 PS 002 525

AUTHOR	Kershner, Keith M.
TITLE	Pennsylvania Preschool and Primary Education Project: 1968-1969 Final Report to the Ford Foundation.
INSTITUTION	Pennsylvania State Board of Education, Harrisburg.; Pennsylvania State Dept. of Public Welfare, Harrisburg.
Spons Agency	Ford Foundation, New York, N.Y.
Pub Date	Oct 69
Note	161p.
EDRS Price	EDRS Price MF-$0.75 HC-$8.15
Descriptors	Community Cooperation, *Culturally Disadvantaged, *Curriculum Evaluation, *Educational Objectives, Elementary School Mathematics, Grade 1, Grade 2, Grade 3, Inservice Teacher Education, Kindergarten, Nongraded System, Parent Attitudes, *Program Descriptions, *Program Evaluation, Reading Programs, Student Behavior, Teaching Techniques
Identifiers	California Test of Mental Maturity, CTMM, Metropolitan Achievement Test, Metropolitan Readiness Test, Oral Language Scale, Preschool Inventory, Slosson Intelligence Test

Abstract

To improve the education of culturally disadvantaged children, this project focused on children's specific behavioral deficits, teacher preparation, parent attitudes, health and service agencies, and local school districts. The project was carried out in a rural Appalachian school with 122 children, 30 percent Negro and 70 percent white, and in an urban school with 350 children, 95 percent white and 5 percent nonwhite. Both schools were in low income areas. An emphasis on individualization and an ungraded teaching approach was used in the rural school for children in kindergarten through third grade. Teachers met with testing and curriculum consultants; parents attended group meetings; and future program plans were made by the local school district. The urban school program was similar but had a more active and successful parent education program and better coordination of agencies. To evaluate the program, all children were pre- and posttested, using the Oral Language Scale, the Science and Math Study Group Individual Math Inventory, the Metropolitan Achievement Test, and the California Test of Mental Maturity. There were no control groups. Both groups of children showed significant cognitive gains and teachers

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

ED033759

1968-1969 FINAL REPORT

to

THE FORD FOUNDATION

PENNSYLVANIA PRESCHOOL AND PRIMARY EDUCATION PROJECT

Keith M. Kershner
Project Coordinator

October, 1969

Conducted by
The Department of Education and The Department of Public Welfare
of the
Commonwealth of Pennsylvania

PS002525

ED033759

ACKNOWLEDGEMENT

Over the years countless persons and agencies have contributed to the conduct of this project. Here special acknowledgement is given to those most directly involved this year.

The major financial support was received from the Division of Education and Research of The Ford Foundation. Sincere thanks are extended to Miss Marjorie Martus, Assistant Program Officer, and Mr. Paul Nachtigal, Ford Consultant, for their constructive criticism and advice.

Particular appreciation is expressed to Dr. Robert B. Hayes, Director of the Bureau of Research, Department of Education, for his continuing interest and support and stable advice in times of difficulty. Appreciation is also expressed to Dr. Frank M. Durkee, Director of Applied Research, who handled all budgetary matters.

Special recognition is given to Mrs. Beatrice L. McInerney who, as Director of Program Development last year, established much of the rationale and operational procedure by which the project was conducted.

Grateful appreciation and acknowledgement is extended to all of the teachers - Mrs. Vivian L. Bishop, Mrs. Anne Creamer, Mrs. Mary D. Hudders, Mrs. Doris C. Hays, Mrs. Joanne B. Scheib, Mrs. Isabel C. MacKenzie, Mrs. Marjorie Apple, Mrs. Virginia Griffin, Mrs. Patricia Newton, Mrs. Barbara Ingram, Mrs. Beverly Schwartz, Miss Carol Whitebread, Miss Ellen McGill, Mrs. Dorothy Galanka, Miss Linda Helmstadter, and Mrs. Hazel Slabaugh, and the teacher aides - Mrs. Sally Fertig, Mrs. Sally Stewart, Mrs. Joann Henriques, Mrs. Sandy Long, Mrs. Grace Dickinson, Mrs. Goldie Scarborough, Mrs. Elaine Battis, Mrs. Jane Peters, and Mrs. Audrey Lazuka, and to Mrs. Jean Adams, Mrs. Elise Wilson, Mrs. Susan Giordon, and Miss Linda Helmstadter who served in the role of social worker. Their energy, spirit and skill were essential in making the program a success.

Appreciation is expressed to the school district coordinators, Mrs. Betty Mellor, and Mr. George Plava, and the school principals, Mr. Arnold Lindley, and Mr. Carmen Guappone, whose high interest and constant attention were responsible for keeping all of the components of the program going and maintaining a developmental climate within their schools.

Recognition is given to the project consultants, Dr. Alfred Castaldi, Dr. Bradley Seager, and Dr. Lorraine Morgan, who regularly worked with the project teachers and staff and excelled in their task, displaying not only knowledge and skill, but also commitment.

Grateful appreciation is expressed to Mr. Russell A. Dusewicz, Director of the Early Childhood Project, West Chester State College Learning Research Center, for his advice and aid on all aspects of this project and for handling much of the statistical analysis at the West Chester Computer Center.

Appreciation is also expressed to Dr. Carroll A. Curtis, Research Associate, Bureau of Research, for his helpful suggestions in editing this report.

A special note of thanks is given to Mrs. Catherine Hollenbaugh and Mrs. Darby Leppert who accomplished superbly the sometimes mountainous secretarial tasks associated with this project. Their manner was always cheerful and their performance excellent.

TABLE OF CONTENTS

ACKNOWLEDGEMENT i

LIST OF TABLES. v

I. INTRODUCTION. 1

II. A SURVEY OF RELATED LITERATURE. 3

III. PURPOSE 9

IV. TREATMENT PROGRAM 11

The Rural School

Educational Program. 11
Teacher Development. 14
Agency Coordination. 15
Parent Program 15
Program Establishment. 16

The Urban School

Educational Program. 17
Teacher Development. 18
Agency Coordination. 18
Parent Program 18
Program Establishment. 20

V. EVALUATION. 21

The Rural School

Educational Program. 21
Teacher Development. 34
Agency Coordination. 35
Parent Program 35
Program Establishment. 36

The Urban School

Educational Program. 36
Teacher Development. 46
Agency Coordination. 46
Parent Program 48
Program Establishment. 49

TABLE OF CONTENTS (CONTINUED)

VI. A CONCLUDING NOTE 50

BIBLIOGRAPHY 51

APPENDICES

A. The Rural School Reading Program 56

B. The Rural School Math Program 73

C. The Urban School Workshop Agenda 128

D. Rural School Teacher Evaluations 131

E. Urban School Teacher Evaluations 139

F. Urban School Workshop Report 148

G. Test-Retest Correlations 154

LIST OF TABLES

Page
1. Rural School Analysis of Primary Oral Language Scale 28
2. Rural School Analysis of Primary SMSG Math Inventory 29
3. Rural School Analysis of Primary Metropolitan Achievement Test 30
4. Rural School Analysis of Primary California Test of Mental Maturity 31
5. Rural School Analysis of Preprimary Oral Language Scale . . 32
6. Rural School Analysis of Preprimary California Test of Mental Maturity. 33
7. Urban School Analysis of Primary Oral Language Scale 39
8. Urban School Analysis of Primary SMSG Math Inventory 40
9. Urban School Analysis of Primary Metropolitan Achievement Test 41
10. Urban School Analysis of Primary California Test of Mental Maturity. 42
11. Urban School Analysis of Preprimary Oral Language Scale. 43
12. Urban School Analysis of Preprimary Metropolitan Readiness Test 44
13. Urban School Analysis of Preprimary Preschool Inventory. 45
14. Urban School Analysis of Preprimary Slosson Individual Intelligence Test. 45
15. Test-Retest Correlations Conducted at the Urban School 155

I. INTRODUCTION

On July 1, 1963 the Pennsylvania Preschool and Primary Education Project was launched as a "comprehensive and long-range attack on the drop-out problem." More specifically this project, jointly supported by the Ford Foundation and the Commonwealth of Pennsylvania, was aimed at gathering and analyzing information about the behavior of culturally disadvantaged children. This knowledge was then to be used to develop and institute a comprehensive methodology administered by the school system to improve the education of disadvantaged children. From a wider view, the development, utilization, evaluation, and dissemination of innovative and eclectic techniques would provide to any school having the characteristics of the project schools a basis for improving their programs. Thus this project does not fit exactly any one of the usual categories by which a study may be classified. It is a research project in that designs and evaluations are used. It is a developmental project in that knowledge gained is continually used to modify future programming. It is also a demonstration project in that the feasibility and consequences of employing certain procedures were shown in an area of education which has become increasingly critical and virtually a matter of national survival.

Within the goal of improving the education of culturally disadvantaged children, four objectives or strategies were initially established:

1. To develop an educational program which compensates for certain specific behavioral deficits of the children from culturally disadvantaged environments.

2. To improve the educational preparation of teachers and other professionals who are presently serving or will serve the culturally disadvanged child.

3. To develop more effective relationships between health and service agencies and the schools so that they can better serve the children and the parents of families living in culturally disadvantaged neighborhoods.

4. To change the attitudes and behavior of parents so that they will exert a positive influence on the educational development of their children.

To these there should be added another objective which has increased in importance with time and is the most important if evidenced improvements are to be maintained.

5. To motivate and assist school districts in the continuance of preschool and primary programs as part of their regular function.

These objectives have retained a stability over the years if the methods used in their pursuit have not.

The advantages as well as the disadvantages of a several-year study have been fully experienced. The time afforded the opportunity to benefit from mistakes and to develop from year-to-year in the same effort. It allowed the collection of some longitudinal data. It gave the possibility of exercising persistence in affecting variables which are typically resistant to change, such as attitudes, self-concepts, and role structures. The temporal advantage was a blessing, for its lack may be suspected as a cause for failure of many projects in this field; but the simple physical fact of six years presented many complex and confounding problems. Designs predicated upon the location of a particular people at particular places fell to pieces because people are prone to move these days. Among our samples, people moved frequently and the conventional research strategy of experimental and control groups dissipated after a few years. It was also found that some of the schools became uncomfortable with what was being attempted, and the central staff became uncomfortable with what some of the schools were doing. Thus, the sample composition changed. Finally, with a fair frequency the project leadership and staff experienced change with time. An influx of new ideas can be helpful to be sure, but it can also be abrupt and disruptive to continuous and directed progress. New personnel also involves new resolution of personality interaction which can be a source of inefficiency and a counterbalance to the advantage of time.

The Pennsylvania Preschool and Primary Education Project began with one school and in its second year was expanded to seven project school districts. In this the sixth and final year, the staff has worked quite intensively with two districts, one of which has been involved for six years, and the other for five years. The last two years of the project have been uniform and consistent in conduct. This report deals primarily with the year 1968-1969, with the inclusion of certain longitudinal data from the year previous. No further historical reference will be made as it may be found in previous reports. However, it was felt that for this final report, a brief summary of the past experience could be afforded for completeness and as a setting for the last year's activity.

II. A SURVEY OF RELATED LITERATURE

Since 1963 a great deal has occurred in the theory and methodology surrounding work with the "culturally disadvantaged." It is the purpose of this chapter to review those developments particularly as they are related to research in the field. This is the context within which the present study has been conducted. It serves to emphasize the rationale which has developed in this area of education as well as delineating the procedures and results which are associated with its application.

The terms "cultural deprivation" and "cultural disadvantage" have become accepted elements in our vocabulary. Conceptualizations of what these words mean vary from individual to individual. They generally connote that set of conditions usually associated with economically impoverished environments which result in disabilities among its inhabitants in meeting the performance standards upon which "success" has become contingent in comtemporary society. The ramifications of the general phenomenon are as numerous as they are pervasive, but these disabilities have become very clear and very critical in our educational systems. The fact that culturally deprived children do not do well in our schools has become well established (Cooper, 1964; Deutsch, 1965; Karp and Sigel, 1965; Whitt, 1966; Green, Hoffman and Morgan, 1967). These children enter school with lower abilities, as measured by the typical aptitude and achievement measures, and maintain a disadvantage relative to middle class children as they go through the school system. The gap between the normative standards and their performance often increases with time to effect what Deutsch has called a "cumulative deficit." Thus, as time goes on the disadvantaged child falls further behind his "advantaged" peers. The result is that the child is ill-prepared for anything in life but failure, and a perusal of any of a number of sources would indicate that this is what he finds (Bremner, 1964; Havighurst, 1966; Thompson, 1968). This is a problem of major proportions as well as a glaring failure of our educational systems, as public responsibility seems to be currently defined.

The content and causes of the problem have been seriously investigated and described from several points of view including those indicated above, Conant (1961) and Deutsch, Katz and Jensen (1968). The major constructive approach defines the deprivation as an environmental anomaly which must be overcome by exposure to an enriched environment which will stimulate growth.[1] By this conception an environment low in stimulational frequency, variety, patterning and meaningfulness might be expected to foster in its inhabitants passivity, limited adaptability and general inexperience. Conversely, supplying an environment high in stimulational qualities should promote reversals in these trends. Support has been lent to these assertions by the laboratory work of several investigators who found that differential stimulation during infancy resulted in differential trends in adulthood with respect to learning capacity and adaptability (Krech, Rosenzweigh and Bennett, 1961; Levine, 1960).

The Skeels and Skodak (Skeels, 1966) study also stands prominent in the background of the environmental enrichment approach. The initial study, conducted in the 1920's, involved an experimental and a control group of about thirteen children each between one and two years old. All children were institutionalized in an orphanage depicted as severely limited in the opportunity for physical and emotional stimulation. The experimental children were removed and placed singly in wards for mentally retarded females at a state hospital. Here they were "adopted" by inmates and given a great deal of attention and experience. The control children were left in their orphanage environment. The groups were characterized as being similar in terms of birth histories, medical histories, and family backgrounds. After a two and one-half year experimental period all children were measured on the 1922 version of the Kuhlman-Binet Intelligence Test. The experimental children exhibited a mean gain of 25.5 points, while the control group had a mean loss of 26.5 points. This difference was highly significant ($p < .001$). After two more years the children were measured again. The total mean gain for the experimentals was 31.6 points compared with a 20.6 loss for the controls. At this time eleven of the experimental children, none of the controls, had been adopted. Twenty years later all subjects were assessed on "real life performance." Of the experimentals eleven were married with families, they had a yearly median income of $4,800; and their mean of school years completed was 11.8. Of the controls, one was married; they had a median yearly income of $1,200; and their mean of school years completed was 3.95. This study suffered from a number of problems experimentally, but it is a dramatic and classic demonstration of the possible effects of differential opportunity in our concern as it is related to environment. The study illustrates on a gross level what we mean by deprived environments and enriched environments.

---

[1] Other theoretical bases include those emphasizing genetic determinants, medical factors such as diet, structural linguistics, motivational and self concept reinforcement, etc. These approaches per se have not received the attention that the enrichment approach has; however, the enrichment approach in practice is a very eclectic one, taking elements from virtually all the others. It is this overlapping and generality of the enrichment approach that make it the most comprehensive, hence fruitful for discussion, yet complex in terms of analyzing treatment

With the advent of Head Start in 1965, these idea were operationalized on a large scale. The projects conducted have varied widely in procedure, but the generalization can be made that they have sought to overcome the effects of deprived environments experienced at home via exposure to enriched environments at school. The preschool and primary projects attempt to prepare the child for school and the competition level that he will encounter. This goal has been approached with varying degrees of success. The published studies having a reasonable evaluation component in their design are discussed below.

Smith (1968) tested fifty-five poverty area children who had had a full year pre-kindergarten program and forty-seven same aged children from the neighborhoods who had had no pre-kindergarten experience on the Stanford-Binet (SB) and the Peabody Picture Vocabulary Test (PPVT). The children were tested once during the summer before entering kindergarten. The experimentals scored significantly higher on both the SB ($p < .001$) and the PPVT ($p < .05$). The treatment was specified only as a Head Start program, and since there was no pretesting, possible sample bias had an unknown effect. It might be proposed that parents enrolling their children in Head Start programs are systematically different (thus providing different environments) from those who do not; however, the results obtained by the Westinghouse Learning Corporation (1969) do not support this proposal. If this data can be accepted, then the conclusion that the children with preschool experiences were better prepared to enter school than those who had not had such experiences is warranted.

McInerney, Durr, Kershner and Nash (1968) pre- and posttested approximately two hundred children on a series of measures including the Science and Mathematics Study Group Individual Mathematics Inventory, the Oral Language Scale, the Metropolitan Readiness and Achievement Tests, and the California Test of Mental Maturity. These children were five-and six-year olds from severe poverty areas. All were participants in an enrichment program designed around diagnostic and team-teaching procedures with the extensive use of manipulable materials and adult-child interaction. No control groups were employed in the design. On all measures the children exhibited consistent and statistically significant gains. The lack of control groups presents problems of interpretation; however, the subjects progressed from well below normal, in normative standard scores, into the average category on the standardized instruments. In light of the research cited above with regard to the progress that can be typically expected, this is meaningful though not conclusive.

PS 002525

Gray and Kaus (1965) conducted one of the more sound experimental studies in this field. Sixty four-year old culturally deprived children were assigned randomly to three treatment groups. Group One received three years of summer school plus weekly contact with a home visitor during the school year. Group Two participated in two years of summer school plus weekly contacts with a home visitor. Group Three received nothing but the testing. A Fourth Group selected independently served as an external control. The treatment for the experimental groups was structured around three stimuli and five reinforcement dimensions: gross amount of potential stimulus input, number of different kinds of stimulus input, figure ground relations, total amount of reinforcement, source of reinforcement, amount of verbal reinforcement, direction of reinforcement, and focus of reinforcement. All groups were tested at the beginning and end of each summer on the SB, the PPVT and the Illinois Test of Psycholinguistic Abilities (ITPA). The course of development on the three measures was similar. All groups started at about the same level, but by the end of the second summer the two experimental groups were significantly higher ($p<.05$) than the two control groups while there was no difference between the two experimental groups or the two control groups. By the end of the third year the differences were quite marked, the curves for the experimental groups resembling accelerated growth curves while the control curves were rather platocurtic. This experiment was well conducted and supportive of the enrichment hypothesis.

DiLorenzo (1968) randomly assigned 780 three and one-half to four and one-half year old culturally deprived children to experimental and control groups. The control group received a traditional half-day nursery school program while the experimental group experienced three different treatments varying in rationale, content and time of exposure. This lack of consistency in the independent variable is explained as resulting from the large numbers of school districts involved. For various reasons only 465 children remained for the posttesting: the SB and the PPVT. The results indicated that the experimentals exhibited no change on the SB while the controls had a significant mean loss of 2.55 points ($p<.05$). On the PPVT both groups had pretest-posttest gains, but the experimentals gained significantly more ($p<.05$). It was concluded that such enrichment programs have the potential of at least preventing the regression that is frequently encountered.

Weikart (1964) and Deutsch (1965) used enrichment programs with groups of over thirty culturally deprived children. Experimentals and similar controls were posttested at the conclusion of one year of treatment. It was found that the experimental groups had gained significantly ($p<.05$) more than the controls on the SB and the PPVT. These results are also generally supportive of the enrichment hypothesis.

It may be observed that the reported studies vary widely in their methodology and the composition of the treatment variable is frequently imprecise. These factors make comparison difficult. Also, in the practical situation randomization techniques are possible only infrequently. This limitation on control comparison and sample sizes makes it difficult to confidently generalize the results. However, given these limitations, it can be generally stated that enrichment programs have beneficial effects on their participants--effects frequently of a cognitive nature. These are gains which would not be expected given the observed regression with no special program, but they cannot be conclusively attributed to the variable which we have called "cultural enrichment.

If the gains achieved during the course of enrichment programs are real, then the next question is whether or not they are transitory. That is, will observed differences between children who have had preschool experience and those who have not, cease to exist once both groups have been in a regular school situation for a period of time? The experimental question here involves an attention or novelty effect. Spicker, Hodges, and McCandless (1966) conducted an experiment involving four intact groups of thirteen deprived preschool children. Group One received an experimental enrichment program. Group Two was a regular kindergarten class. Group Three was an at-home control, and Group Four was an outside control. All groups were pretested and posttested on the SB, PPVT, and the ITPA. The overall results indicated that the experimental group significantly outperformed the control groups on all measures. However, when all groups were retested on the three instruments after the children had been through one year of the regular school program, no significant differences remained. This suggests that possibly the initial differences were due to the novelty and attention factor of the program and that gains are equalized once all children have been exposed to the novel elements of any school program which are not present in the home environment. Under this proposition the integrity of the enrichment variable crumbles.

The Westinghouse Learning Corporation and Ohio University (1969) conducted a large scale study to determine precisely this: whether the gains of children given preschool experience relative to those who have had no such experience are maintained through the elementary grades. This, after all, is the critical question, both experimentally and practically. The goal of equal preparation will never be attained if a position of relative disadvantage is resumed as soon as treatment ends. In the Westinghouse study a sample of summer and full-year Head Start centers was selected representing a cross-section of the country. Children who had participated in the activities of these centers and were in the first, second, and third grades were tested on a variety of cognitive and affective measures. Control children from each location who had no Head Start experience and were also in the first, second and third grades were selected and tested on the same measures. All children had resided in their respective areas since the inception of Head Start. No determined relevant differences were found in the personal and background characteristics of the experimental and control samples. No determined relevant differences were found between the remaining control sample and the population of non-Head Start people who had migrated from their areas since the inception of Head Start. The samples thus seemed to be reasonably similar except for the preschool vs no preschool experience. No overall differences were found between experimental and control children on any measure. This study was admittedly post facto and subject to all the limitations pertaining thereto; however, the results were nonsupportive at least and devastating at most. There are at least two equally plausible explanations for these results. The enrichment projects may not be working because of procedural inadequacies or because they get the children too late or for too short a time. A second reasonable possibility is that the regular school experience encountered by the Head Start children is nonsupportive or antithetical to the gains they have attained. These are the most pertinent areas to be investigated in the future.

The Pennsylvania Preschool and Primary Education Project attempted to deal with some of these problems of continuity extending the program to cover a series of age levels so that the child's experience will be an extensive one, as well as integrating the regular school program with the preschool and primary program. Attempts were also made to employ the various treatment elements in a coordinated and consistent manner. This is the subject of the remainder of this report.

III. PURPOSE

The basic intent of this project has been expressed in the statement of continuing objectives in the introduction of this report. These objectives can be summarized as being an effort to develop and operationalize a comprehensive school-administered program for culturally disadvantaged children which will help them to achieve while they are in the program and prepare them to achieve in the regular school situation. This involves working with the child and the other significant elements in his environment which shape his development--parents, present and future teachers, schools and other health and service agencies. Viewed from the time dimension this effort can be divided into two parts: the pursuit of objectives for the children currently in the program, and the attempt to ensure the continuance of an active developing program, as well as an aware consistent regular school program for furtherance of the children's education. It is the contention of the Pennsylvania Project that inadequate attention to the various significant elements in the child's environment, inadequate program time for the child himself, and the inability to affect the regular school program such that it can knowledgeably receive preschool and primary project participants are critical factors in accounting for many such projects not living up to their expectations. Thus, in the Pennsylvania Project emphasis was placed on these factors.

There is inherent in this study a series of assumptions. They are directly related to the stated objectives and basically posit that the accomplishment of these objectives will indeed improve the education of the culturally disadvantaged child. These assumptions specifically are:

1. Culturally disadvantaged children can be better prepared to succeed in the first year of school if they begin preparation while they are three to four years of age.

2. These children will do better work in the primary grades of school if the educational program for these grades is articulated with the preschool and if it is designed specifically for the characteristics of culturally disadvantaged children.

3. These children will perform more successfully in school if their physical and psychological problems are attended to.

4. Parents of culturally disadvantaged children will take a more active, positive role in assisting in the education of their children if they learn how better to perform the role.

5. Teachers will become more effective with culturally disadvantaged children if they learn more about the characteristics of these children and ways to assist them to learn.

These assumptions are all, in other contexts, material for researchable hypotheses. It is a viable question as to whether or not they can be realistically extracted and adequately tested. At any rate, it was not within the scope of this project to do so. Neither did this project employ a tightly structured research design with a control situation. Rather the Pennsylvania Project developed and tried a comprehensive program, from the evaluation of which one could generally conclude the existence or nonexistence of educational progress among the children. This must then be compared with the general and specific progress to be expected from children given no treatment or another treatment in order to determine the worth of these efforts. Beyond this generality developed and imposed evaluative procedures were used to assess the value of individual elements of this program. These procedures varied from the subjective to the quasi-experimental, but it must be recognized that such evaluations provided information as perceptively as could be conveyed, not proofs. This report hopes to disseminate what has been learned about the workings of preschool and primary education programs, to build cases for those elements concluded to be integral, and to make available information relevant to the creation and conduct of such programs by other agencies.

IV. TREATMENT PROGRAM

During the 1968-69 school year the Pennsylvania Project worked extensively in two school districts, each having one experimental sample. One district was rural, the other could be classified as urban or suburban depending on the criteria. Due to the great differences between the districts they are described separately in the treatment and evaluation sections of the report.

THE RURAL SCHOOL

The Rural School served a number of small and scattered settlements in the Appalachia area. The settlements were largely old mining towns that had had little improvement for many years. Indoor plumbing and central heating were frequently lacking. Medical and other social services were typically not economically nor physically available. The racial composition of the area was approximately 30 percent Negro and 70 percent White. It was found that 98 percent of the residents had lived at their present address for more than two years. Thus indicating a stable as well as an extremely depressed environment.

There were approximately 122 children enrolled in the project, with a staff of four teachers. Forty-three percent of the families had a yearly income of less than $3000, and an additional 32 percent an income of less than $4000. There were 42 percent of the families receiving public assistance during the past year, and 4 percent of the mothers were working. The size of the families was found to be relatively large, 83 percent had three or more children, and 32 percent six or more children. Chronic physical or mental disease effect about one-fourth of the parents. Approximately 70 percent of the parents had not completed high school.

Educational Program. The mainstay of the educational program was a diagnostic ungraded approach to teaching. Project children from the ages normally associated with Kindergarten through Second Grade were grouped according to their level of functioning in the various school activities rather than solely on the basis of age. Obviously there are logistical limitations placed on such groupings, but the children generally progressed at their own rate through the major cognitive areas. A continuous effort was made to evaluate each individual child's needs in order to make the non-**graded** groupings work. At the beginning of the year a series of instruments were administered to all project children. These instruments were used both for program evaluation and for providing the teachers with information on individual children. (The tests will be discussed more fully in the research sense below in the evaluation section). The tests administered by the central staff provided the following individual data:

1. The Adapted Monroe Oral Language Scale

    a. willingness to communicate
    b. quality of ideas
    c. ability to define words
    d. sentence structure

2. The S.M.S.G. Individual Math Inventory

    a. object recognition
    b. photo recognition
    c. vocabulary
    d. object memory
    e. photo memory
    f. matching colors
    g. naming colors
    h. identifying colors
    i. matching shapes
    j. naming shapes
    k. identifying shapes
    l. equivalent sets
    m. counting buttons
    n. counting sets
    o. rote cardinal numbers
    p. rote counting by tens
    q. recognition of number symbols
    r. identification of number symbols
    s. marking number symbols
    t. naming place value
    u. forming place value
    v. ordinal numbers
    w. triangles
    x. circles
    y. ordering and classifying

3. The Metropolitan Achievement Tests

    a. word knowledge
    b. word discrimination
    c. reading
    d. arithmetic skills

4. The California Test of Mental Maturity

    a. language I.Q.
    b. non-language I.Q.
    c. total I.Q.

In addition to these measures, the Project Coordinator administered individual tests requested by the teachers. The initial information on each child, along with the teachers' continuing evaluation, provided the basis for grouping children for various activities. There was a consistent effort to encourage the teachers to identify conceptual stages of growth in their children so that they could guide the child through one stage while preparing him for the next more difficult one.

The major substantive foci of the educational program were language arts and mathematics. The language element was based on the following premises:

1. Motivation and facility in language structures and conditions what the child learns and how he learns, and also sets the limits within which future learning can take place.

2. To use language to express logic is an outcome of activity and experiences, combined with language during and following the experience.

3. Oral language facility and motivation and awareness of the relationships between talk and print, are developmental abilities essential to the successful learning of reading and writing, and concurrently reinforcing activities in the progress of these skills.

Accordingly, the school environment was made rich in physical and climatic resources for interaction. In order to provide each child with opportunities to manipulate objects and materials, and thus to learn to use language in settings appropriate to his age and stage of development, the teachers attempted to equip the classrooms with many fascinatingand intriguing materials that invited selection and manipulation: water, soap suds, clay, finger paint, paper, wood, scrap materials, blocks, furniture, dishes, boxes, boards, and buckets. Materials to touch, look at, and smell permitted continued investigation and elicited response.

The classroom climate likewise was a free one encouraging experience and expression. The arrangement of desks and tables was a flexible and changing one; teachers initiated and supported verbal interaction among the group. Time-blocks were devoted each day to work in language arts. The groups for these sessions were selected on the basis of each child's level of functioning in that area. The attempt was to group learning mates, rather than age mates. The aim was flexible grouping and regrouping based on the teaching team's continuous assessments and evaluation of the changes in behavior observed as a result of the activities provided. As they worked, the teachers and other staff developed their own projected stages of development and day-to-day assessment techniques, employing them with awareness of individual needs and encouragement of individual expression. The specific developmental program created by the Rural School staff appears in Appendix A.

The math program was based on the following premise: mathematical ideas develop slowly and can be developed and understood most easily through activities that call for thoughtful manipulation of concrete objects and those activities that make children aware of mathematics in their everyday lives, The classroom climate and resources indicated above are likewise conducive to development in this area. As in the language program, the content of the child's own experiences and interest becomes the first content of the math program. The teacher stimulated the children to discuss ideas, plan, gather information, ask questions, and make comments. The same procedure of time-blocks for math sessions was used. The teacher encouraged interaction in these time-blocks by assigning small groups to work together on independent activities while she worked with another small group, by encouraging children who understood a particular concept to help others, and by permitting quiet conversation while working on independent tasks. The specific math developmental program created by the Rural School staff and consultants appears in Appendix B.

Along with the language arts and math time-blocks there was a third major element in the curriculum--the selection or manipulation time-block. During this session each day the child was able to select any of a number of activities in which he wanted to participate. Thus, the children formed their own groups on an interest basis. The teacher made herself available for talking with the children and raising questions. The activities varied widely in content but were constructive, consistent with the program and utilized learning resources.

As can be seen, the educational program subscribes heavily to the principle that the active teacher is the critical factor in the educational process. There was no imposition of a formula for success which the staff had to simply administer. The teacher was called upon to be directly involved in the formulation of every aspect of her children's education. One of the major functions of the central staff was to help her with this task.

Teacher Development. The direction and support provided to the teachers took several forms. The administration and analysis of the formal testing instruments was done by the central staff. The Project Coordinator worked with the teachers individually and in group sessions in the interpretation and utilization of this information. It was hoped that an interest and knowledge in tests and measurements could be developed to the degree that teachers would be able to use formal testing not bounded by the traditional grade equivalent and percentile interpretations. The value of such testing for the teachers was for the diagnosis of individual needs and the consequent curriculum prescriptions.

The second major support was the regular provision of highly qualified curriculum consultants and release time for the teachers to work with them. Both consultants were from universities in nearby metropolitan areas; one provided expertise in language arts, the other in mathematics. Both were enthusiastic about diagnostic, individualized teaching. These consultants each visited the Rural School at least once or twice a month and worked with the staff individually and as a team. The primary function of these sessions was to discuss the procedures being developed and used in the context of the project philosphy. The teachers were guided in the assessment of individual functioning and needs and the provision of appropriate activities and resources. Individual problems and experiences were discussed with an attempt to maximize interaction among the teachers and consultants. The atmosphere was one of working together. The consultants were valuable resources for the teachers in their own development, not expositors of a packaged program.

The Rural School principal also took a very active role in the project. He maintained a daily contact with the teachers and children to help with problems and encouraged group sessions with the teachers and himself to keep communication among the staff and assure mutual benefit from each person's experience.

Agency Coordination. No efforts of this kind were made at the Rural School.

Parent Program. Another critical conceptual element was the involvement of parents. This has the potential effect of shaping their own lives as well as the environment of their children. In the Rural School, distance between families presented an ongoing problem in getting people together or in having people come into the school. The role of social worker was handled on a part-time basis by one of the program's teachers.

The parent education phase of the Rural School program went into operation in September of the school year with a general meeting of all parents of children in the program. The relaxed atmosphere and discussion-type format gave parents an ideal chance to become acquainted and to ask questions. The nongraded program was discussed along with ways to enhance the child's home learning experience. Pamphlets on home teaching techniques were distributed. Of the parents attending, about half volunteered to help in the classroom. Tentative schedules were drawn up, but an "open door policy" was extended to all parents. Subsequent group meetings took place at the school.

Other general meetings followed in later months. One of the most successful being an explanation of the program at a P.T.A. meeting where each of the team teachers spoke on a different aspect of the program, answered questions posed by skeptical parents, and generally promoted favorable public relations.

Thirty-five individual families were visited at home by the social worker where needs that could be met by the school for the child and his family were discussed. Telephone and personal school contacts were also made.

Program Establishment. This being the final year for the Preschool and Primary Education Project under the sponsorship of the Ford Foundation and the Commonwealth of Pennsylvania, it was especially important to insure that the program could function in the future according to the wishes of the local school district. The first part of this effort was to contact various federal, state, and local agencies to obtain supplemental funds. Over the years each local district had assumed more and more of the project's operating costs, but in depressed rural areas the inadequate tax base caused a real problem.

The second effort was to get the staff to the point of development where they could operate and continue to grow on their own if outside resources could no longer be marshalled. To this end, during the summer following the school year, the Rural School staff met daily for a week with each of the two consultants. During these sessions the programming for next year was worked out, individual problems were dealt with, and the consultants attempted to give the knowledge and confidence needed to function in the future. These efforts insured that the program could continue on an adequate basis as long as the Rural School desired. The Rural School principal also took an active role in informing the rest of his faculty about the preschool and primary program so they could better work with its graduates. Other teachers made visits to the classrooms on an individual basis.

THE URBAN SCHOOL

In terms of physical location, the urban component would more properly be called "suburban," however, its major characteristics of poverty have resulted in the designation of "urban," which will be used for identification purposes.

The Urban School served a large, contained, poor community in the midst of the middle-class environs of the eastern metropolis of this state. The housing development is of the post-war veteran's vintage and is uniform in its lack of physical attention during the intervening years. The units are all owned and rented by a single enterprise. The area is approximately 95 percent White, and 5 percent non-White. Fifty-seven percent of the families have lived at their present address for more than two years. This community in summary is a poor, crowded, mobile one.

The Urban School is located right in the community and serves as a neighborhood elementary school. The project enrolled 350 children with a staff of 12 teachers and 8 aides. Ten percent of the families had a yearly income of less than $3000, and an additional 30 percent an income of less than $4000. There were 31 percent of the families receiving public assistance, and 23 percent of the mothers were working. Approximately 70 percent of the parents had not completed high school. The size of the families was found to be relatively large, 45 percent of the families had three to five children, and 39 percent had six or more. Chronic physical or mental disease effected 26 percent of the parents.

Educational Program. In the Rural School, children from Kindergarten to Third Grade age levels were directly involved with the project, whereas the Urban School directly involved children from First to Third Grade age levels. Direct involvement refers to project financial responsibility. Some of these children have been with the project since they were of nursery age, others entered the program at various points along the way. Since the original intent of this project was to shift the focus of attention from the preschool to the primary levels, the final year is most concerned with the primary program. The major responsibility for the preschool elements lies with the schools themselves. There has been a continuous effort, of course, to maximize the overlap and maintain continuity regardless of the fiscal distinctions which can be drawn. Thus, progress at all levels was observed and resources were extended as much as possible across the preschool and primary continuum.

The Urban School has become completely involved in the experimental program. Children are enrolled in the Nursery and continue through the Third Grade, after which they are transported to other schools. The preschool sections are funded by the district and the federal government. In addition to the principal and two social workers the Urban School has a full-time project director who initiates and coordinates the activities. Thus, the Urban School is a much larger and more complete operation.

The educational program was very similar to that of the Rural School. It was based on the elements of diagnostic teaching, individualized programming, time-blocks, an enriched and supportive environment, nongraded procedures, and team teaching. These elements were described in the educational program section on the Rural School. The larger staff and facilities allowed more individualization, but the guiding principles are the same. The preschool elements, which grew out of this project over the years were entirely consistent with the philosophy and methodology, though no longer the responsibility of the central staff. In this report the analytical emphasis will be on the primary children, but the preschool sections will be a parallel consideration.

Teacher Development. In the Urban School, as in the Rural School, the central staff administered and processed a series of pupil tests. The results of these tests, which were made available to the school staff, served two functions; first, they provided research information to the central staff about the pupils both individually and collectively, and second, they provided a diagnostic teaching resource for the school staff in their efforts to individualize instruction.

Two university consultants were also provided to the Urban School on a regular basis; one, the math specialist who also served the Rural School, the other, an early childhood specialist who focused on evaluation and staff coordination. The content and procedure of their consultation was similar to that in the Rural School.

Additional consultation was provided by the resident project director who frequently worked with the teachers both individually and in groups. Since the Urban School was an organization incorporating a number of preschool and primary units, this daily communication and coordination was an essential element of the program.

Agency Coordination. The Urban School conducted an active program in the involvement of other agencies with the total program of the project children. A full-time social worker was provided for the school staff by the State Department of Public Welfare. The resident project director also had a background in social work and explored every possibility of coordinated activities between the school and health and welfare agencies. In addition, the Urban School actively extended invitations to other educational agencies to become involved with the program.

Parent Program. Because of the expressed desire to involve parents in a program which would acquaint them with the educational needs of their children as well as a program designed to focus on problems relevant to the parents, an active parent education program was conducted at the Urban School. The objectives of this program were as follows:

1. To provide the opportunities and means for parents to develop for themselves a parent education program that was satisfying and productive for them.

2. To enable the parents to find a variety of ways for them to make a contribution to the program through involvement.

3. To improve the parents' concept of themselves in the parent role presuming that, as a result, the relationship between the parent and child will be strengthened.

4. To allay parents' suspicions and mistrust of the school establishment; through development of relationships of trust it was hoped that parents would develop an interest in and support of the educational opportunities of their children.

5. To provide a direct, constructive opportunity for school staff to become well-acquainted with the families served. It was hoped that this would increase the staff's awareness of the strengths and dynamics of the family life affecting the children's development.

The procedural characteristics of this parent program were as follows:

1. The program was self-determined by the parents within the broad objectives stated above.

2. The school staff was available but were not the "leaders" of the program.

3. Space was made available in the school building even though it was already crowded.

4. Babysitting was provided free at meeting times.

5. Coffee, and often other refreshments, were available; smoking was allowed.

6. The meetings provided access to "outside" resource people in an informal setting.

7. The meetings provided opportunities for development of leadership skills from within the parent group.

8. The program provided an opportunity for a positive identification with the community.

9. The program enabled parents to observe and to participate in the educational process of their children.

10. The program was largely nonstructured.

11. Except for hard-core regulars, within a year's time there were shifts in the composition of the group, as

> well as changes in the relationships between those involved in the program, i.e. between parents, between staff and parents, etc.

Program Establishment. The two major efforts in terms of insuring program establishment at the Urban School were seeking funds and support for its continuation and acquainting other schools in the district with what had been learned about the children's special needs and abilities. In pursuit of the first, the whole staff was involved in popularizing this as an ongoing program within the district. Principally, the evaluation consultant and project director worked with various district officers to assure them of the worth and product of the program, as well as resolving administrative demands and supplies. The project director further marshalled other federal, state, and local resources to support the program at various levels.

To begin the task of acquainting other teachers who have project children in the later elementary grades, the Urban School hosted a summer workshop. The objectives of the workshop were threefold.

1. To review achievements of the Preschool and Primary Education Program, and to project the significance of the findings to future years.
2. To inform other administrators and staff who have children who have gone through the Urban School program what has been learned about the characteristics and special educational needs of the project children.
3. To provide an opportunity for the teachers to understand themselves better in relation to Urban School children.

Project teachers, other school teachers, administration staff, consultants, and central staff all attended these meetings. The content of the workshop appears in Appendix C. As can be seen from the objectives, these activities functioned both to develop project teachers and to pave the way for a desired continuity between the Urban School program and the regular school program.

A third enterprise was intended to have effect in both of the above-mentioned efforts. This was the production of a graphic booklet to describe the children, program, and results of the Urban School program in a visual, as well as a verbal way. This presentation would not have the receptive audience limitations of a technical report and would be distributed widely.

V. EVALUATION

THE RURAL SCHOOL

For the evaluation section each element of the program will be treated separately as it was in the descriptive section.

Educational Program. The major techniques for evaluating the effects of the educational program were a series of achievement and aptitude tests administered and scored by the central staff in a pretest-posttest design spanning the school year. The individual measures are described below:

The Oral Language Scale (OLS)

The OLS administered was one originally devised by Marion Monroe for individual, diagnostic use by the classroom teacher. Monroe (1951) states that "a child's verbal interpretation of a picture gives the teacher the opportunity to observe several aspects of language in a single, very simple, informal test." The OLS consisted of one stimulus picture chosen by the tester to satisfy these criteria: (1) there should be two or more easily recognized characters in the picture, such as a boy, girl, baby, father, mother, or pets; (2) there should be a central activity or "story," such as playing a game, having a picnic, or baking a cake; (3) each character should be doing something different; and (4) the setting or background should be appropriate enough to indicate where the action is taking place, but should not contain so many items as to distract from the main theme.

The picture was presented individually to each child in a child-adult situation. After rapport had been established, each child was told:

> "I want you to look at this picture and tell me everything you can about the picture. What can you tell me about the picture?"

If the child hesitated to speak, the tester added, "What do you see?" The child was then allowed to verbalize as he chose and all responses were recorded verbatim on paper by the tester. After the child's first stop, the tester probed once by saying, "Is that all?" An average of five sample verbalizations were collected for each child. After the child finished verbalizing about the picture, the tester chose five words (names of objects) which had been used by the child in his replies and asked the child to tell what each one was (e.g., "What is a wagon?"). Again all responses were recorded verbatim.

Each child's response was rated by the investigator on four five-point scales corresponding to the four subtests of the OLS:

A. Quality of Ideas 1 2 3 4 5

1. Concerned with the immediate environment. Objects and events are seen as separate items, e.g., boy, girl, dog, wagon.

2. Sees a relationship between the actor and action, e.g., boy is running, dog is barking.

3. Sees descriptive qualities or characteristics, e.g., little boy, brown dog, red wagon.

4. Can see cause and effect relationships and make deductions, e.g., little boy likes the dog, the wagon belongs to the little boy.

5. Can generalize situations and relate situations to his own experiences. e.g., my dog is different from the boy's dog, not all dogs look like that.

B. Ability to Define Words 1 2 3 4 5

1. Cannot verbalize any definition.

2. Defines by simple repetition of word, e.g., ball is a ball.

3. Defines by stating use or function, e.g., to play with.

4. Defines by stating descriptive qualities, e.g., made of rubber, it's red, it's round.

5. Defines by generalizing, classifying or giving a variant meaning of the object, e.g., a kind of toy, where you can dance, baseballs are smaller than basketballs.

C. Willingness to Communicate 1 2 3 4 5

1. Speech is blocked and/or incomprehensible.
2. Hesitates to volunteer information.
3. Can communicate basics.
4. Discusses the subject clearly.
5. In addition to clear discussion, ability to integrate present experiences with future and past.

D. Sentence Structure 1 2 3 4 5

1. Not enough verbalizing to be rated.
2. Speaks in phrases, dependent clauses.
3. Subject-verbs-object linked with ands.
4. Uses complete simple sentences correctly punctuated.
5. Standard syntax, connection of related ideas, more complex sentences, use of dependent clauses.

The Science and Math Study Group Individual Math Inventory (SMSG)

The SMSG Inventory was also diagnostic in nature. Developed as a measure to determine placement in math ability groups, the SMSG Inventory is part of a special curriculum project for culturally disadvantaged primary school children. The test, as does the subsequent math program, emphasizes manipulable and concrete materials and relevant responses. The inventory is basically an evaluation of readiness of the children to learn mathematical concepts. The test as administered was modified somewhat for the purposes of this project and structured into twenty-five subsections. These sections were as follows:

1. Object Recognition--measuring the ability to name a series of commonly encountered objects.
2. Photo Recognition--measuring the ability to name a series of pictures of commonly encountered objects.

3. Vocabulary--measuring the knowledge of a series of words generally relevant to primary math processes.

4. Object Memory--measuring the short-term retention of tangible object configurations.

5. Picture Memory--measuring the short-term retention of pictured object configurations.

6. Matching Colors--measuring the ability to match samples of colors with other samples of the identical colors.

7. Naming Colors--measuring the knowledge of color names.

8. Identifying Colors--measuring the passive knowledge of color names by the ability to select the proper color when given the name.

9. Matching Shapes--measuring the ability to match samples of shapes with other samples of the identical shapes.

10. Naming Shapes--measuring the knowledge of shape names.

11. Identifying Shapes--measuring the passive knowledge of shape names by the ability to select the proper shape when given the name.

12. Equivalent Sets--measuring the ability to construct with blocks sets of the same content as those presented on a series of cards.

13. Counting Buttons--measuring the ability to count series of buttons.

14. Counting Sets--measuring the ability to count the members of series of sets.

15. Rote Cardinal Numbers--measuring the knowledge of the sequence of cardinal numbers from 1 to 100.

16. Rote Counting by Tens--measuring the ability to count by tens from 10 to 200.

17. Recognition of Number Symbols--measuring the knowledge of number symbol names selected from 1 to 100.

18. Identification of Number Symbols--measuring the passive knowledge of number symbol names by the ability to select the proper number when given the name.

19. Marking Number Symbols--measuring the ability to write numbers selected from 1 to 100.

20. Naming Place Value--measuring the ability to name the number value of sets of objects composed of sets of tens and ones.

21. Forming Place Value--measuring the ability to form specified sets from given sets of tens and ones.

22. Ordinal Numbers--measuring the ability to indicate the correct block in a series given its ordinal position.

23. Triangles--measuring the ability to select the triangles from a display of shapes and order them from smallest to largest.

24. Circles--measuring the ability to select the yellow circles from a display of shapes and order them from smallest to largest.

25. Ordering and Classifying--measuring the ability to separate a display of shapes into categories by shape and identify the smallest numbers of each shape category.

These sections vary in difficulty primarily on the dimensions of knowledge--ability, passive knowledge--active knowledge, and concrete--abstract.

Three testers administered sections of the inventory individually to each child. After the raw score totals for each subtest were recorded, all were converted to a four-point system for purposes of evaluation. Since there were twenty-five subtests in all, a perfect score would be 100.

The Metropolitan Achievement Test (MAT)

The Metropolitan Achievement Test consisted of four subtests--word knowledge, word discrimination, reading, and arithmetic skills. Some of the uses of the MAT's results as suggested in the manual are: (1) to determine the planning instruction best adapted to the pupil's needs, and (2) to compare present achievement with past achievement in order to determine and evaluate rate of progress. The MAT was administered to groups of fifteen subjects by one tester, aided by one other adult as proctor. The manual was followed verbatim for actual testing procedures. Scoring by trained personnel yielded raw scores and grade-equivalent scores for the four subtests and total.

The California Test of Mental Maturity (CTMM)

The CTMM is a group intelligence test designed to provide information about the functional capacities that are basic to learning, problem solving, and responding to new situations. The CTMM was administered to groups of fifteen subjects by one tester, aided by one other adult as a proctor. The manual was followed verbatim for actual testing procedures. Scoring by trained personnel yielded raw scores and IQ equivalents for language, nonlanguage and total IQ.

The OLS, SMSG, MAT and CTMM were administered to all children at the primary level.[1] Pretest-posttest differences were tested for significance via the correlated "t" test procedure.[2]

On the OLS only two subtests, Ability to Define Words, and Sentence Structure, showed significant improvement (see Table 1). For analysis of the SMSG, subtests 1, 2, 3, 5, 6, 7, 8, 9, 13, 14, 23, and 24 were eliminated from consideration due to perfect performance on the pretest. Of the 13 remaining subtests nonsignificant gains were exhibited on only two: the total score gains for all subtests were significant (see Table 3). Likewise, all pretest-posttest gains on the CTMM were significant (see Table 4).

---

[1] For this testing as in all that is reported below total N may vary between tests and may differ with the total number of children in the project. This is due to attrition occurring between testing sessions and absences during either the pretest or posttest period.

[2] When the word "significance" appears in this discussion, unless qualified it means statistically significant at least beyond the 5 percent level of probability ($p < .05$) on a one-tailed test. Specific significant levels are indicated on each tabular presentation.

The OLS and the CTMM were also administered to all children at the preprimary level. Total score gains on the OLS, as well as subtest score gains with the exception of Quality of Ideas, were statistically significant (see Table 5). On the CTMM, nonlanguage and total IQ gains were significant (see Table 6).

Since there was no control group with which to make comparison, analysis of the data was accomplished with pretest-posttest comparisons. The correlated "t" procedure, also known as the "t" test for paired data, was used to make this comparison. The pretest and posttest scores on the same individual constituted the pairing. Reliability of the instruments with this particular population--an essential element for comparison--was established with a sample and reported as the test-retest correlation in Appendix G, page 154.

TABLE 1

RURAL SCHOOL

ANALYSIS OF PRIMARY ORAL LANGUAGE SCALE

Subtest	Pretest Mean	Posttest Mean	Pretest SD	Posttest SD	t Ratio
1. Quality of Ideas	2.71	2.46	1.25	0.80	-1.29 N.S.
2. Ability to Define Words	3.19	3.71	0.88	0.66	3.61 **
3. Willingness to Communicate	3.37	3.42	0.83	0.60	0.48 N.S.
4. Sentence Structure	3.94	4.29	0.89	0.60	2.53 **
Total Score	13.21	13.77	3.13	1.98	1.30 N.S.

The significance tests was a "t" test for correlated data performed on the pretest and posttest scores of all subjects (n = 52; *p< .05, 1.64; **p< .01, 2.33).

TABLE 2

RURAL SCHOOL

ANALYSIS OF PRIMARY SMSG MATH INVENTORY

Subtest	Pretest Mean	Posttest Mean	Pretest SD	Posttest SD	t Ratio
4. Object Memory	3.71	3.58	0.60	0.74	-1.02 N.S.
10. Naming Shapes	3.29	3.75	0.86	0.61	4.02 **
11. Identifying Shapes	3.69	3.96	0.75	0.27	2.70 **
12. Equivalent Sets	3.67	3.85	0.96	0.63	1.18 N.S.
15. Rote Cardinal Numbers	3.31	3.65	1.14	0.92	2.98 **
16. Rote Counting by Tens	2.12	2.94	1.05	1.28	5.72 **
17. Recognition of Number Symbols	3.40	3.69	1.00	0.80	2.60 **
18. Identification of Number Symbols	3.02	3.79	1.20	0.60	5.15 **
19. Marking Number Symbols	3.31	3.63	1.25	0.86	2.26 **
20. Naming Place Value	1.19	3.08	1.53	1.48	8.11 **
21. Forming Place Value	1.15	3.00	1.61	1.52	8.01 **
22. Ordinal Numbers	3.33	3.90	1.56	0.45	4.17 **
25. Ordering and Classifying	3.52	3.29	0.93	1.43	0.96 N.S.
Total Score	86.50	92.79	9.43	8.07	8.93 **

The significance test was a "t" test for correlated data performed on the pretest and posttest scores of all subjects (n = 52; *p <.05, 1.64; **p <.01, 2.33).

TABLE 3

RURAL SCHOOL

ANALYSIS OF PRIMARY METROPOLITAN ACHIEVEMENT TEST

Subtest	Pretest Mean	Posttest Mean	Pretest SD	Posttest SD	t Ratio
1. Word Knowledge	1.46	2.09	.48	.62	9.69 **
2. Word Discrimination	1.48	2.10	.50	.74	7.12 **
3. Reading	1.49	2.05	.27	.78	5.93 **
4. Arithmetic Skills	1.61	2.05	.63	.74	6.65 **

The significance test was a "t" test for correlated data performed on the pretest and posttest scores of all subjects ($n = 51$; $*p < .05$, 1.64; $**p < .01$, 2.33)

TABLE 4

RURAL SCHOOL

ANALYSIS OF PRIMARY
CALIFORNIA TEST OF MENTAL MATURITY

Subtest	Pretest Mean	Posttest Mean	Pretest SD	Posttest SD	t Ratio
1. Language I.Q.	93.75	100.88	22.58	19.47	3.02 **
2. Non-Language I.Q.	95.82	102.63	19.09	21.29	2.83 **
Total I.Q.	94.27	102.08	22.47	20.99	3.62 **

The significance test was a "t" test for correlatated data performed on the pretest and posttest scores of all subjects ($n = 51$; $*p < .05$, 1.64; $**p < .01$, 2.33).

TABLE 5

RURAL SCHOOL

ANALYSIS OF PREPRIMARY ORAL LANGUAGE SCALE

Subtest	Pretest Mean	Posttest Mean	t Ratio
1. Quality of Ideas	2.23	2.26	0.05 N.S.
2. Ability to Define Words	2.45	3.19	3.37 **
3. Willingness to Communicate	2.55	3.10	2.25 *
4. Sentence Structure	3.52	4.07	2.42 *
Total Score	10.80	12.60	2.69 **

The significance test was a "t" test for correlated data performed on the pretest and posttest scores of all subjects (n = 30; *p $<$.05, 1.70; **p $<$.01, 2.46).

TABLE 6

RURAL SCHOOL

ANALYSIS OF PREPRIMARY
CALIFORNIA TEST OF MENTAL MATURITY

Subtest	Pretest Mean	Posttest Mean	t Ratio
1. Language I.Q.	93.50	98.11	1.36 N. S.
2. Non-Language I.Q.	97.07	102.00	2.11 *
Total I. Q.	93.68	100.25	2.45 *

The significance test was a "t" test for correlated data performed on the pretest and posttest scores of all subjects (n = 28; *p< .05, 1.70; **p< .01, 2.47).

In summary, the cognitive gains exhibited by the Rural School children were consistent and generally significant. On many measures the size of the gains would argue also for their being practically significant and a demonstration of better educational preparation for the children involved. Staff evaluations of program effect will be presented in subsequent sections.

Teacher Development. Formal evaluation of teacher development was accomplished via a questionnaire, "The Teacher and the Disadvantaged Child: An Inventory of Knowledge and Beliefs," developed by the Harrisburg City Schools and Pennsylvania State University. This inventory consisted of 70 multiple-choice items dealing with the education of culturally disadvantaged children. Each item was followed by four responses, any number of which could be correct. The correctness or incorrectness of each answer was determined by a panel of experts from the fields of education, psychology, and sociology. These expert opinions resulted in a total of 134 of the 280 possible answers being judged correct. The Inventory was administered to the project teachers at the beginning and end of the school year by the Project Coordinator. In each testing session the teachers were asked to complete the Inventory twice: once answering as they thought experts would, and then answering as they personally believed. The authors of the questionnaire reasoned that the first response was indicative of knowledge, and the second response was indicative of the degree of acceptance of knowledge, and hence a measure of attitude. Pretest and posttest scores were analyzed using the correlated "t" procedure:

	n	Pretest Mean	Posttest Mean	t Ratio
Expert Beliefs	4	44	86	5.45 **
Personal Beliefs	4	53	82	2.69 *

In both cases pretest--posttest gains were large and significant (Expert $p < .01$, Personal $p < .05$). When differences between Expert Belief scores and Personal Belief scores were tested, neither the pretest pairs or posttest paired scores were found to be significantly different (pretest "t" = 1.58 N.S., posttest "t" = -.67 N.S.). Since the number of scores tested was so small, any lengthy statistical inference is not warranted. It would seem, however, that over the course of the year the teachers became more knowledgeable about the education of culturally deprived children as seen by experts.

A second method of evaluation was a very informal one of soliciting the teachers opinions. The written replies to this request are found in Appendix D. These replies concern the project as a whole and thus are also evaluative of the other aspects of the program. In general, it can be said that the teachers have viewed the project experience as a developmental one in that they feel more confident in their efforts and more successful in their task.

The final evaluation is one of product. A review of the programs presented in Appendices A and B will attest to the teachers' development in curriculum design. For an evaluation of their primary product--educated children--one must await the test of time, but, as best as can be determined in the short run, the results are exemplary.

Agency Coordination. Since no specific efforts were directed toward agency coordination, there will be no evaluative statements. It might be mentioned, however, that the relative isolation of rural areas directly limits the non-school resources which could properly be employed for the well-being of the child. This presents a real problem for the rural schools, and should be a focus of local, state, and national concern.

Parent Program. Since no direct measures were practical in assessing the value of the parent program, the nature and extent of participation will be used as an index of effectiveness. An extensive parent program was made difficult at the Rural School because of the physical distances involved, and the fact that there was no full-time social worker on the school staff. One of the teachers served admirably in the social worker capacity on an extra-assignment basis. Given the circumstances, the parents were reached with a degree of success. The parent volunteers were faithful in their attendance and proved interested in, and helpful to, the program by telling group stories, helping in the cafeteria, giving individual attention to students, and telling other parents of their activities with the school.

Besides aiding in the classroom, parents were asked, and often volunteered, to help with the Halloween, Christmas, Valentine's Day, and birthday parties where they organized the children for games and programs. The most interested, but at one time the most skeptical of the parents organized a luncheon to which the teachers and principal were invited. This was held in May at the parent's home and was one of the highlights of the year. The parents felt great pride and a sense of accomplishment about their work. Thus, it seemed that the parents were involved in school affairs. In order to further this, next year the rationale, content, and results of the program will be explained to the parents in verbal and written form. Since many questions have been asked this year by individual parents, the interest level may be sufficiently high to get them involved in the curriculum during following years. The report card system has also been revised to make the device more meaningful by giving information about functional levels and rate of progress, rather than the traditional judgemental glyphs.

Program Establishment. The major efforts in this direction were to insure that the program would have the financial backing to continue, and that the staff would be at a level of development where they could conduct a progressing program.

With regard to financial continuation, the school district has decided to support the project with its allocation of federal funds and to expand it into other areas of the system.

The latter concern was discussed in the previous section and can be summarized with the statement from one of the consultants to the Rural School: "The team at McClellandtown has, in my opinion, demonstrated exceptional skill in operating as a team in planning, grouping children, evaluating pupil progress, setting objectives, and in making use of the total resources available to the team. Mr. Guappone [the principal] has contributed enormously to the success of this team by joining me in observations and team meetings and, more importantly, by supporting and guiding the team while providing the team teachers with an extraordinary latitude for decisions that affect the team. The four teachers have grown more in six months than most graduate students I have worked with do in an internship program or in a master's program for experienced teachers. They began with positive attitudes toward the children and a realistic set of expectations for the children but a lack of structured educational principles and a shortage of educational techniques. Of course, the children brought with them an environmental deficit that is appalling. In these circumstances the gains made by almost all children is heartening."

THE URBAN SCHOOL

Being near a large city, the Urban School had an environment and resources different from the Rural School. Putting the same type of program into this setting produced results as described below.

Educational Program. Again, the major techniques for evaluating the effects of the educational program were a series of achievement and aptitude tests, administered and scored by the central staff, in a pretest-posttest design spanning the school year. In addition to the Oral Language Scale, the SMSG Math Inventory, the Metropolitan Achievement Test, and the California Test of Mental Maturity described above, the following measures were also employed in the Urban School:

The Metropolitan Readiness Test (MRT)

The Metropolitan Readiness Test consists of six subtests--word meaning, listening, matching, alphabet, numbers, and copying. The MRT was devised to measure the extent to which school beginners have developed the several skills and abilities that contribute to readiness for first-grade instruction. It has been suggested by the authors of the MRT, that its results may be used (1) to obtain a quick indication of the readiness of each pupil to do first grade work, especially with reference to the learning of reading and arithmetic; (2) as an objective, reliable basis for initial grouping of pupils for instructional purposes; to adapt instruction to the level of the class and of subgroups that may be organized; and (3) to determine (later) whether pupils have progressed in accordance with their readiness or aptitude, by comparing readiness test results with achievement test results or teacher grades at the end of the year. The MRT was administered to groups of fifteen subjects by one tester, aided by one other adult as proctor. The manual was followed verbatim for actual testing procedures. Scoring by trained personnel yielded raw scores and grade equivalent scores for the six subtests and total.

The Preschool Inventory (PSI)

The PSI consists of four subtests--Personal-Social Responsiveness, Associative Vocabulary, Concept Activation (Numerical), and Concept Activation (Sensory). The PSI was designed to measure preschool children on a wide range of tasks relevant to school functioning and progress. This recently developed instrument has shown both usefulness in diagnosis and accuracy for research. The PSI was administered individually to each child by the central staff testing team. Prescribed procedures were followed. Scoring yielded raw scores for each subtest and total.

The Slosson Intelligence Test (SIT)

The SIT is a short-form individual intelligence measure. It is fairly recent in origin, yields one total score, and has shown impressive correlations with the Stanford-Binet LM (.90 - .98), as well as high test-retest reliability (.97). The SIT was administered individually to each child by the testing team. Prescribed procedures were followed.

The OLS, SMSG, MAT, and CTMM were administered to all children at the primary level. Pretest-posttest differences were tested for significance via the correlated "t" test procedure.

In the OLS only one subtest, Sentence Structure, showed significant improvement (see Table 7). For analysis of the SMSG, subtests 1, 2, 5, 6, 7, 8, 9, 13, 14, 23, and 24 were eliminated from consideration because of perfect performance on the pretest. Of the 14 remaining subtests, nonsignificant gains were found on only four, the ten remaining subtest scores showed significant improvement (see Table 8). All MAT pretest-posttest gains were significant (see Table 9). Total IQ improvement measured by the CTMM was also found to be significant (see Table 10).

The Oral Language Scale, the Metropolitan Readiness Test, the Preschool Inventory, and the Slosson Intelligence Test were also administered to children at the preprimary level. On the OLS, all subtest and total scores evidenced significant pretest-posttest improvement (see Table 11). The MRT subtest, with the exception of Word Meaning, and the total scores showed significant gains (see Table 12). On the PSI, likewise, all subtest and total score gains were significant, as was improvement on the SIT (see Table 13 and Table 14).

Thus, cognitive gains exhibited by the Urban School children were also found to be consistent and generally significant.

TABLE 7

URBAN SCHOOL

ANALYSIS OF PRIMARY ORAL LANGUAGE SCALE

Subtest	Pretest Mean	Posttest Mean	Pretest SD	Posttest SD	t Ratio
1. Quality of Ideas	2.63	2.74	1.04	0.80	0.74 N.S.
2. Ability to Define Words	3.20	3.09	0.74	0.61	-0.97 N.S.
3. Willingness to Communicate	3.20	3.17	0.84	0.71	-0.25 N.S.
4. Sentence Structure	3.76	4.09	0.87	0.65	2.61 **
Total Score	12.79	13.09	2.90	2.27	0.79 N.S.

The significance test was a "t" test for correlated data performed on the pretest and posttest scores of all subjects ($n = 80$; $*p < .05$, 1.65; $**p < .01$, 2.33).

TABLE 8

URBAN SCHOOL

ANALYSIS OF PRIMARY SMSG MATH INVENTORY

Subtest	Pretest Mean	Posttest Mean	Pretest SD	Posttest SD	t Ratio
3. Vocabulary	3.89	3.99	0.35	0.11	2.38 **
4. Object Memory	3.40	3.35	0.82	0.85	-0.39 N.S.
10. Naming Shapes	2.76	3.39	1.06	0.83	5.40 **
11. Identifying Shapes	3.54	3.69	0.82	0.72	1.26 N.S.
12. Equivalent Sets	3.66	3.72	0.95	0.74	0.50 N.S.
15. Rote Cardinal Numbers	2.18	3.11	1.16	1.18	6.33 **
16. Rote Counting By Tens	1.41	2.13	1.03	1.19	5.65 **
17. Recognition of Number Symbols	2.54	3.54	1.21	0.74	8.67 **
18. Identification of Number Symbols	2.99	3.68	1.27	0.70	5.43 **
19. Marking Number Symbols	1.88	3.31	1.26	1.03	9.67 **
20. Naming Place Value	1.15	2.51	1.55	1.66	7.81 **
21. Forming Place Value	1.06	2.31	1.41	1.74	6.75 **
22. Ordinal Numbers	2.95	3.44	1.24	0.99	4.13 **
25. Ordering and Classifying	3.29	3.56	1.30	1.11	1.52 N.S.
Total Score	79.68	87.41	10.47	13.71	6.43 **

The significance test was a "t" test for correlated data performed on the pretest and posttest scores of all subjects (n = 80; *$p < .05$, 1.64; **$p < .01$, 2.33).

TABLE 9

URBAN SCHOOL

ANALYSIS OF PRIMARY METROPOLITAN ACHIEVEMENT TEST

Subtest	Pretest Mean	Posttest Mean	Pretest SD	Posttest SD	t Ratio
1. Word Knowledge	1.39	1.74	.19	.22	5.11 **
2. Word Discrimination	1.34	1.94	.17	.37	5.67 **
3. Reading	1.24	1.53	.20	.24	3.86 **
4. Arithmetic Skills	1.22	1.70	.24	.41	6.04 **

The significance test was a "t" test for correlated data performed on the pretest and posttest scores of all subjects (n = 14; *$p < .05$, 1.77; **$p < .01$, 2.65).

TABLE 10

URBAN SCHOOL

ANALYSIS OF PRIMARY CALIFORNIA TEST OF MENTAL MATURITY

Subtest	Pretest Mean	Posttest Mean	Pretest SD	Posttest SD	t Ratio
1. Language I.Q.	92.54	96.00	17.49	18.51	1.44 N.S.
2. Non-Language I.Q.	97.43	99.25	18.02	20.47	0.66 N.S.
Total I.Q.	94.92	98.44	16.55	18.19	1.85 *

The significance test was a "t" test for correlated data performed on the pretest and posttest scores of all subjects (n = 61; *p <.05, 1.65; **p <.01, 2.33).

TABLE 11

URBAN SCHOOL

ANALYSIS OF PREPRIMARY ORAL LANGUAGE SCALE

Subtest	Pretest Mean	Posttest Mean	t Ratio
1. Quality of Ideas	2.43	3.09	2.43 *
2. Ability to Define Words	2.87	3.74	5.19 **
3. Willingness to Communicate	2.39	3.78	6.45 **
4. Sentence Structure	3.83	4.65	17.45 **
Total Score	11.57	15.26	6.79 **

The significance test was a "t" test for correlated data performed on the pretest and posttest scores of all subjects ($n = 23$; $*p < .05$, 1.72; $**p < .01$, 2.51).

TABLE 12

URBAN SCHOOL

ANALYSIS OF PREPRIMARY METROPOLITAN READINESS TEST

Subtest	Pretest Mean	Posttest Mean	Pretest SD	Posttest SD	t Ratio
1. Word Meaning	6.89	7.19	2.35	2.58	0.45 N.S.
2. Listening	8.11	10.19	3.81	3.24	2.38 *
3. Matching	7.11	9.89	4.02	4.02	2.78 **
4. Alphabet	6.00	12.41	4.56	4.59	5.76 **
5. Numbers	9.81	14.26	5.93	4.99	4.53 **
6. Copying	6.26	10.15	4.08	4.42	4.39 **
7. Draw-a-Man	2.52	3.78	1.20	1.20	4.86 **
Total Score	44.63	64.00	20.48	18.36	4.51 **

The significance test was a "t" test for correlated data performed on the pretest and posttest scores of all subjects (n = 27; $*p < .05$, 1.70; $**p < .01$, 2.48).

TABLE 13

URBAN SCHOOL

ANALYSIS OF PREPRIMARY PRESCHOOL INVENTORY

Subtest	Pretest Mean	Posttest Mean	t Ratio
1. Personal - Social Responsiveness	15.60	21.19	6.64 **
2. Associative Vocabulary	7.81	14.34	11.09 **
3. Concept Activation - Numerical	7.36	11.79	9.39 **
4. Concept Activation - Sensory	10.40	14.51	8.53 **
Total Score	41.11	62.17	14.42 **

The test of significance was a "t" test for correlated data performed on the pretest and posttest scores of all subjects (n = 47; *p <.05, 1.64; **p <.01, 2.33).

TABLE 14

URBAN SCHOOL

ANALYSIS OF PREPRIMARY SLOSSON INDIVIDUAL INTELLIGENCE TEST

Pretest Mean	Posttest Mean	t Ratio
101.52	109.63	4.57 **

The test of significance was a "t" test for correlated data performed on the pretest and posttest scores of all subjects (n = 27; *p <.05, 1.70; **p <.01, 2.48).

Teacher Development. Formal evaluation of teacher development was accomplished via the Inventory of Knowledge and Beliefs described in the Rural School section. The inventory was similarly administered at the beginning and end of the school year. Pretest and posttest scores were analyzed using the correlated "t" procedure:

	n	Pretest Mean	Posttest Mean	t Ratio
Expert Beliefs	5	48	91	7.17 **
Personal Beliefs	8	61	93	5.67 **

In both cases, pretest-posttest gains were large and significant (Expert and Personal p .01). When differences between Expert Belief scores and Personal Belief scores were tested for significance, it was found that the pretest scores were significantly different ($p < .01$ at 3.37, $t = 3.49$), whereas the posttest scores were not ($t = .37$ N.S.). Since on the pretest the Personal Belief mean was significantly different from the Expert Belief mean, it would seem that the teachers saw their own beliefs at variance with their conception of expert belief. Again, since the number of subjects was so small, further interpretation will not be attempted. However, as at the Rural School, it seems that the teachers improved quite a bit in knowledge of education for the culturally deprived as it has been represented by a panel of experts.

The Urban School teachers were also asked for their own written evaluation; these appear in Appendix E. As distinct from the Rural School, most of these teachers have been with the project for several years. Thus, their statements were not always confined to the program year presently reported, and the historical aspects are evident.

Agency Coordination. The Urban School has developed increasingly more meaningful and useful channels of communication with local health and welfare agencies. The presence of not only the social worker of the Department of Public Welfare, but also having a project director from the social work field, undoubtedly strengthened the possibilities for developing good coordination between the school and health and welfare agencies. At the close of the project, the project staff applied to the Department of Public Welfare for the special assignment of a department social worker to remain at the Urban School to continue to function as a coordinator of services, as well as to strengthen and extend an innovative parent education program that would dovetail with the services of the public agencies. The best way to illustrate the extent of coordination among the local institutions is to describe some of the elements of the current program.

1. The project social worker and a worker of the local board of assistance are meeting weekly with two groups of preadolescents whose families are public assistance recipients and whose chances of being school dropouts are very high.

2. The local psychiatric clinic provides direct psychiatric treatment and/or consultation in the project director's office for one morning every other week. Frequent case conferences are held with school and clinic staff to discuss joint cases.

3. Two or more case workers of the local board of assistance meet clients in the preschool office one morning each week. (This is to accommodate clients who do not have cars in an area where there is very inadequate public transportation.)

4. A local medical school is providing direct medical services to the program and exploring means for assisting in extending services locally.

5. The Family Service Association uses the project office periodically for interviewing purposes.

6. Child Welfare Department has frequent case conferences with school staff. At these staffings plans are made and implemented to work in the most efficient and direct way for the two agencies to accomplish their common objective: to give each child the best opportunity possible to thrive.

7. Representatives of local health and welfare agencies are members of the Medical Review Committee.

8. Close cooperation with the public health department on children for whom the project is jointly responsible typifies the present program. For example, the health department was willing this summer to set up a special clinic day for immunizations which are necessary for school admission.

At the Urban School the importance and time accorded the goal of agency coordination had pervasive and visible effects. In addition to the active program indicated above, it should be remembered that the preprimary program elements were largely supported through funds obtained from federal agencies. The cooperation of other educational agencies was also successfully sought. Secondary schools in the area sent students on a regular basis to work individually with the Urban School children. This served the dual purpose of providing the children a close and informal contact with a concerned adult figure and gave the "tutors" an exposure to a current, critical educational and human problem.

Parent Program. The parent program at the Urban School was also an active and successful one. Below are listed some of the typical projects which took place:

1. Good grooming lessons
2. Cooking lessons
3. Sewing lessons
4. How to make home decorations out of 'nothing'
5. Field trips (as an example of how the principle of self-determination functions for the group, the parents, not the staff, chose to visit the local prison as one of the field trips)
6. Art lessons
7. Exhibition of art at a nearby school
8. Chaperoning children's trips
9. Functioning as teachers' aides, recruiters, case aides, etc.
10. Planning, buying for, and preparing a Puerto Rican meal for the other mothers, staff, and children
11. Developing community action projects
12. Writing letters to government officials
13. Circulating petitions
14. Serving on policy advisory committee
15. Joining other pressure groups in the community

Parent acceptance of, and involvement in, the school is something that has been long sought and, upon occurring, has changed the school environment. Parents regularly and in numbers help out in the classrooms, thus providing more opportunity for individual attention and facilitating a carryover from school to home. The "open door" policy has become a reality as there are always parents around the coffee pot in the preschool office discussing problems and progress. The parents hold well attended weekly meetings and publish their own news pamphlet. They have established their own clothing and goods exchange. The parents also engaged in group activities such as a trip to Washington to talk with Congressional representatives about the problems of poverty. In all these activities the parents' initiative was sought, and they made the decisions; the school functioned as a resource agency to make the projects possible. Together with the agency coordination effort, the parent program was seen as a major step toward solution of the cultural deprivation problem and the poverty cycle.

Program Establishment. Of the three efforts in this area: continuing financial support, developing effective communication with other schools who receive project children, and producing a graphic booklet on the Urban School program, only the second has at this date come to fruition. The previously described workshop took place during the summer and gained an enthusiastic reception. A complete report and evaluation of this event appears in Appendix F. The booklet is now nearing completion and will be published this year. Its effect will be a subject for future evaluators. Regarding financial continuation, the school district and certain federal funds will maintain the bulk of the program. Efforts toward further supplementation and expansion are still under way.

VI. A CONCLUDING NOTE

The failure of our educational systems to adequately meet the needs of the "culturally disadvantaged" continues to be a major problem facing our society. The validity of preschool education as an equalizer of differential environment remains an unconcluded vital debate. Those who await science to present the answer must wait longer still, for science has yet to determine how to adequately test these things with consensus satisfaction. However, the people whose lives are being infused with our failure cannot wait anymore; for them the question is neither academic nor fiscal, it is the reality of the present and the breath of the future.

The Pennsylvania Project has tried to develop a comprehensive plan that would function to improve education in culturally disadvantaged areas. Many aspects of the environment and numerous types of resources were utilized. The educational program was emphasized because that is the medium for success. Teacher development was stressed because the quality of teaching determines the quality of learning. Parent participation was pursued because the parents create much of the child's environment, and they too have things to gain from the school.

Every avenue for involvement of other groups and agencies was investigated because they have resources that legitimately should be applied to this area and, perhaps more importantly, because general awareness of the conditions of poverty is lacking and more people applying themselves to these problems will produce more effective answers. Effort was put into the continuation of these programs after the formal conclusion of the project because a few years of remediating that which took many years to produce will not suffice.

In the perception of the project staff these programs have, over time, met with widely varying degrees of success. There have been many errors and much stumbling, but that is part of the learning process. In the last few years things began to fit together and, if increased quality and quantity of participation can be used as a measure, the programs achieved a healthy success. It can be said decisively that the children involved did not regress scholastically or remain static, but rather that they improved, often dramatically, as reflected by the measurement devices employed. This conclusion is also supported by the observations of the professional, consulting, and research persons who came into contact with the project. The Pennsylvania Project is a demonstration of what can be effectively done at this point in time. Its positive results are encouragement in the face of a difficult task; its shortcomings are the indications of the need for further study.

BIBLIOGRAPHY

BIBLIOGRAPHY

Alpern, G. D. "The Failure of a Nursery School Enrichment Program for Culturally Deprived Children." (Paper presented at the annual meeting of the American Orthopsychiatric Association, San Francisco, 1966).

Brenner, R. H. From the Depths. New York University Press, New York, 1964.

Conant, J. B. Slums and Suburbs. McGraw-Hill Company, New York, 1961.

Cooper, B. "An Analysis of the Reading Achievement of White and Negro Pupils in Certain Public Schools of Georgia." School Review, 72: 462-471, 1964.

Curtis, Carroll A. and Berzonsky, Michael D. Preschool and Primary Education Project: 1965-66 Annual Progress Report, Bureau of Research, Pennsylvania Department of Public Instruction, Harrisburg, 1967.

Dershimer, Richard A. A Comprehensive and Long Range Attack on the Drop-Out Problem, Bureau of Research, Pennsylvania Department of Public Instruction, Harrisburg, 1964.

Deutsch, M. "The Role of Social Class in Language Development and Cognition." American Journal of Orthopsychiatry, 35: 77-88, 1965.

Deutsch, M. Annual Report 1965, Institute for Development Studies, New York Medical College, New York, 1965a.

Deutsch, M., Katz, J., Jensen, A. R. (eds.). Social Class, Race and Psychological Development. Holt, Rinehart and Winston, Inc., New York, 1968.

DiLorenzo, L. T. "Effects of Year-Long Prekindergarten Programs on Intelligence and Language of Educationally Disadvantaged Children." Journal of Experimental Education, 36: 36-39, 1968.

Gray, S. W. and Kaus, R. A. "An Experimental Preschool Program for Culturally Deprived Children." Child Development. 36: 387-398, 1965.

Green, R. L., et al. "Some Effect of Deprivation of Intelligence, Achievement and Cognitive Growth." Journal of Negro Education, 36: 5-14, 1967.

2

Hartman, Allan S. *Preschool and Primary Education Project: 1964-65 Annual Progress Report*, Bureau of Research, Pennsylvania Department of Public Instruction, Harrisburg, 1965.

Hartman, Allan S. *Preschool and Primary Education Project: 1965-66 Annual Progress Report*, Bureau of Research, Pennsylvania Department of Public Instruction, Harrisburg, 1967.

Havighurst, R. J. *Education in Metropolitan Areas*. Allyn and Bacon, Inc., Boston, 1966.

Karp, J. M. and Sigel, I. "Psychoeducational Appraisal of Disadvantaged Children." *Review of Educational Research*, 35: 403-412, 1965.

Krech, D., Rosenzweig, M. R. and Bennett, E. L. "Effects of Environmental Complexity and Training on Brain Chemistry." *Journal of Comparative and Physiological Psychology*, 53: 509-510, 1960.

Levine, S. "Stimulation in Infancy." *Scientific American*, 33: 360-375, 1960.

McInerney, Beatrice L. *et al*. *Preschool and Primary Education Project: 1967-68 Annual Progress Report*, Bureau of Research, Pennsylvania Department of Public Instruction, Harrisburg, 1968.

Monroe, Marion, *Growing Into Reading*. Scott, Foresman and Company, New York, 1951.

Phillips, L. W. *R.E.A.C.H.* (Unpublished Report on Cooperative Research Project No. 5-8072-2-12-1, State University of New York College at Plattsburgh, 1965.)

Skeels, H. M. "Adult Status of Children with Contrasting Early Life Experience." *Monographs of the Society for Research in Child Development*, Vol. 31, No. 105, 1966.

Smith, M. P. "Intellectual Differences in Five Year Old Underprivileged Girls and Boys With and Without Prekindergarten School Experience." *Journal of Educational Research*, 61: 348-350, 1968.

Spicker, H. H., Hodges, W. L., and McCandless, B. R. "A Diagnostically Based Curriculum for Psychosocially Deprived; Preschool, Mentally Retarded Children." *Exceptional Children*, 33: 215-220, 1966.

Thompson, W. R. *A Preface to Urban Economics*, The Johns Hopkins Press, Baltimore, 1968.

Westinghouse Learning Corporation and Ohio University. The Impact of Head Start. The Office of Economic Opportunity, Washington, 1969.

Whitt, R. L. "Attitudes of Teachers in Relation to Student Self-Control and Attitudes Toward School." (Doctoral dissertation, Wayne State University, University Microfilms, No. 67-682, Ann Arbor, Michigan, 1966).

APPENDICES

APPENDIX A

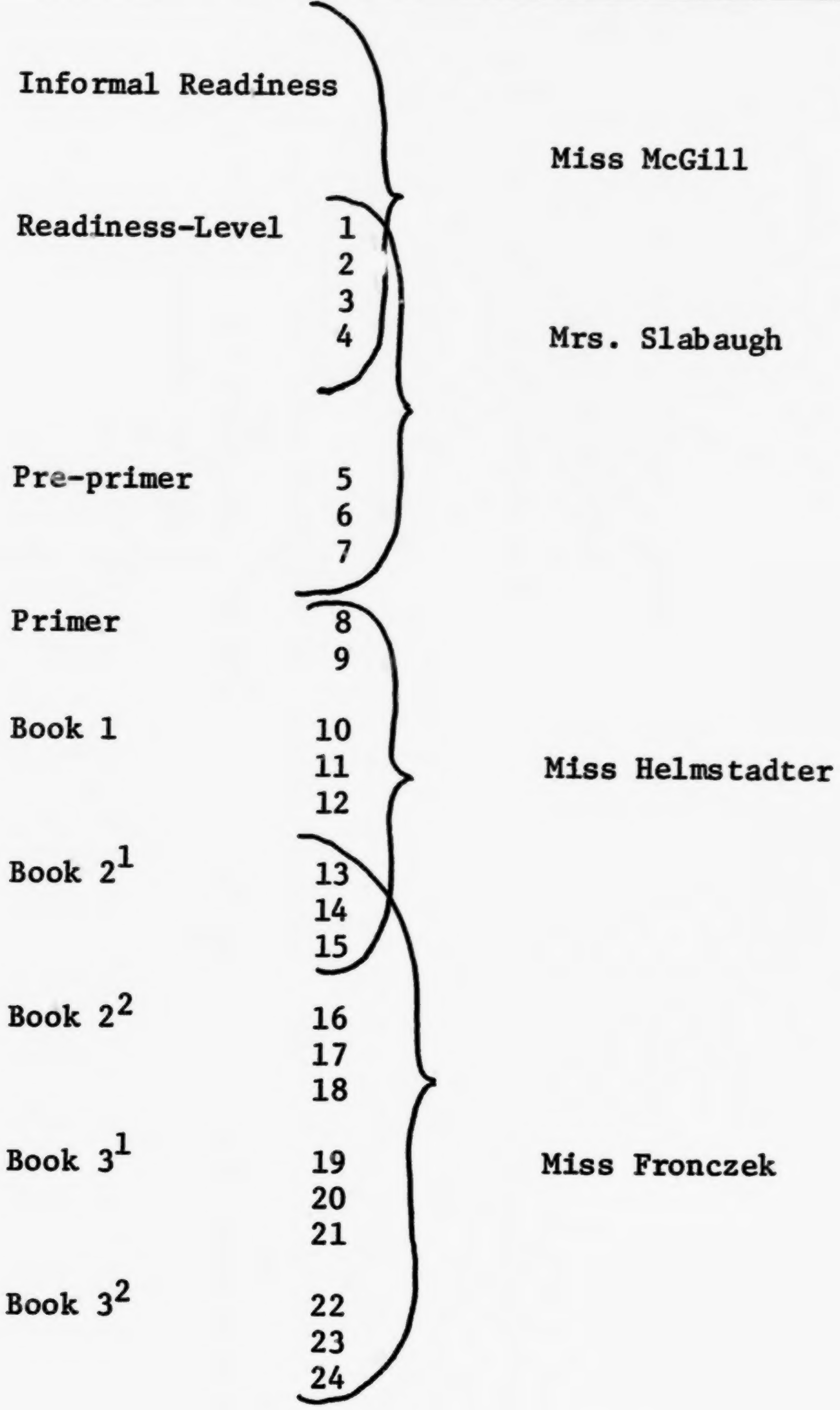
THE RURAL SCHOOL READING PROGRAM
(Similar to Urban School Program)

The basic philosophy of the staff of the Nongraded Program at the Rural School is that each child should progress at his own unique rate. The individual rate for each child is dependent upon his intellectual potential, his experiential background, his motivation to learn, his physical health, his emotional health, and the instructional program. The goal of the Nongraded Program is continuous progress for each child.

The instructional program in reading is based upon the acquisition of skills which are introduced and maintained at each successive level. The teachers of the Nongraded Program are also committed to develop within each child a positive attitude toward reading, independence in learning, a desire to broaden his reading interests, and elevate his reading tastes.

Cooperation between the home, the school, and the community is essential if the goals are to be realized.

SPECIFIC READING LEVELS
NONGRADED PROGRAM
THE RURAL SCHOOL



Rapid Learner

C.A.	4	5	5-6	6	6	6-7	7	7-8	8	8	
Level	Informal Readiness	1-4	5-7	8-9	10-12	13-15	16-18	19-21	22-24	Inter-mediate	

Typical Learner

C.A.	4	5	5-6	6	6	6	7	7	8	8	8+
Level	Informal Readiness	Informal Readiness	1-4	5-7	8-9	10-12	13-15	16-18	19-21	22-24	Inter-mediate

Slow Learner

C.A.	4	5	6	6-7	7	7	7-8	8	8-9	9+	
Level	Informal Readiness	Informal Readiness	1-4	5-7	8-9	10-12	13-15	16-18	19-21	22-24	

Very Slow Learner

C.A.	4	5-6	6-7	7-8	8	8-9	9	9-10	10	10	
Level	Informal Readiness	Informal Readiness	1-4	5-7	8-9	10-12	13-15	16-18	19-21	22-24	

Special Education

SPECIFIC READING LEVELS FOR PRIMARY CYCLE

Informal Readiness

Level	1	Readiness	Unit 1	Names
	2	Readiness	Unit 2	Families and Houses
	3	Readiness	Unit 3	Our School
	4	Readiness	Unit 4	Our Neighborhood
Level	5	Preprimer	Units 1,2,3	People Read
	6	Preprimer	Units 4,5,6,7	People Read
	7	Preprimer	Units 4,5,6,7	People Read
	8	Primer	Units 1, 2	Around the City
	9	Primer	Units 3,4	Around the City
	10	Book 1	Units 1, 2	Uptown, Downtown
	11	Book 1	Unit 3	Uptown, Downtown
	12	Book 1	Unit 4	Uptown, Downtown
	13	Book 2^1	Units 1, 2	My City
	14	Book 2^1	Unit 3	My City
	15	Book 2^1	Unit 4	My City
	16	Book 2^2	Units 1, 2	Green Light, Go
	17	Book 2^2	Unit 3	Green Light, Go
	18	Book 2^2	Unit 4	Green Light, Go
	19	Book 3^1	Units 1, 2	City Sidewalks
	20	Book 3^1	Unit 3	City Sidewalks
	21	Book 3^1	Unit 4	City Sidewalks
	22	Book 3^2	Units 1, 2	Around the Corner
	23	Book 3^2	Unit 3	Around the Corner
	24	Book 3^2	Unit 4	Around the Corner

Goals for Achievement in Nongraded Primary at the Informal Readiness Level

In the Informal Readiness your child will learn to live, to work, and to play with other children of his age. Informal Readiness introduces him to school as a happy place.

Under Social, Physical and Emotional Development the following goals should be achieved:

a. Plays well with others and is a good sport.
b. Is courteous and considerate of others.
c. Accepts and respects authority.
d. Respects the rights and property of others.
e. Is dependable.
f. Takes part in informal conversation.
g. Obeys school rules.
h. Listens while others speak.
i. Enjoys work and play.
j. Knows his whole name, address and telephone number.
k. Accepts constructive criticism.
l. Claims only his share of attention.

Under Work, Health and Safety Habits the following should be achieved:

a. Listens to directions.
b. Follows directions.
c. Makes good use of time.
d. Works without disturbing others.
e. Thinks for himself and solves his own problems.
f. Does work carefully and neatly.
g. Takes good care of materials and other property.
h. Follows safety rules.
i. Uses his handkerchief properly.
j. Keeps reasonably neat and clean.
k. Rests quietly.
l. Follows routines and mechanics of daily schedule.

Under Music, Art and Physical Education the following should be achieved:

a. Takes part in all musical activities.
b. Enjoys singing.
c. Uses art materials correctly.
d. Developing in artistic expression.
e. Has good posture.
f. Responds to rhythm.

Under Informal Reading Readiness the following should be achieved:

a. He enjoys books, stories and poems.
b. He speaks clearly and accurately in a pleasant voice.
c. He is curious and interested in the world in which he lives.

d. He can participate in conversations and informal discussions.
e. He can listen while others speak.
f. He can follow simple oral directions.

Specific Reading Skills for Primary Cycle

At the following level your child should be taught to:

Level I

Match name cards
Perceive differences in lines
Listen to and recite rhymes
Identify and name objects
Explain relationships between objects and characters in a story
Point to likenesses and differences between shapes
Identify sounds made by objects, actions, and animals
Recall story sequence
Willing to listen to stories and poems
Contribute to a group dictated story with the teacher acting as scribe
Exhibit pride of authorship in his contribution to a group story
Share ideas and experiences orally with others

At the following level your child should be taught to:

Level II

Associate word forms with the names of classmates
Point out likenesses and differences in pictures
Recall story details
Describe picture action
Match pictures
Predict the outcome of a story
Name objects in right to left progression
Make lines and circles in left to right progression
Use chalk, pencils, crayons, etc. correctly
Illustrate selected detail of a story
Color recognition and naming

At the following level your child should be taught to:

Level III

Dictate one or two sentence individual stories or captions for his pictures
Recognize and complete patterns
Use labels to identify objects
Arrange picture sequences
Tell stories about pictures, explaining relationships between characters and objects

Use left to right, top to bottom, front to back progression
Name letter forms
Follow one step directions
Supply rhyming words of familiar nursery rhymes

At the following level your child should be taught to:

Level IV

Relate spoken word to written symbols
Use given clues to complete a simple sentence
Match word cards with words on charts and captions
Classify objects
Read the number words: one, two, three
Make pictorial map of classroom, building, and playground

At the following level your child should be taught to:

Level V

Follow two step directions
Identify both upper and lower case letters: m, p, h, b, g
Associate consonant sounds of m, hard g, b, and h with visual forms
Use the clues of the period, exclamation point, and quotation marks in interpreting meaning
Identify plural nouns
Read the basic sight words (28) introduced in the stories
Explain that printed symbols represent a spoken word
Demonstrate ability to read silently and orally simple text
Use guide letters in the dictionary at the preprimer level

At the following level your child should be taught to:

Level VI

Identify such symbols and signs as traffic lights, arrow, fire drill signal, and punctuation
Identify both upper and lower case "s"
Associate the initial consonant sound of "s" with its visual form
Use the pronoun he and they correctly
Use the clue of the question mark in interpreting meaning
Identify and use the rhyming endings at, all, ay
Read selected compound words

At the following level your child should be taught to:

Level VII

Use the pronouns she, it, her, and I correctly
Recognize 's as possessive
Use the word will to indicate future time
Identify both upper and lower case f
Associate the initial consonant sound of f with its visual form
Execute directions given in sequence
Read the basic sight words (87) introduced in the preprimers
Read a teacher constructed simple map of the school building

At the following level your child should be taught to:

Level VIII

Use the table of contents
Identify and use the rhyming endings it, ill, at
Follow written directions
Associate the consonant sounds of c, l, w, d, and r with visual forms
Classify words
Use words that are opposite in meaning
Use the pronouns her, his, my correctly
Use the words then, in, on, by, into correctly
Use the word endings ed and ing correctly
Increase the number of compound words he can identify
Identify both upper and lower case letters of alphabet in sequence
Explain purpose of the title of a story
Complete partially written sentences
Define words using context clues and a beginning dictionary
Use guide words in a simple dictionary
Uses alphabetical sequence to locate words in a simple dictionary
Draw a simple map of his neighborhood

At the following level your child should be taught to:

Level IX

Associate the initial consonant sounds of t, n, y, and p with their letter form
Use the words have, had, there, was, were, who, and what correctly
Use the contractions n't, 'm

Identify root words
Identify compound words
Use the pronoun him
Read number words through seven

At the following level your child should be taught to:

Level X

Recognize selected final consonants s, n, d, g, t, r, m
Use context to discover meaning
Use pronouns: he, she, they
Use comparative word as
Use compound words with self
Recognize rhyme endings: an, old, and
Use place words: on, in, by, over, under
Use capital letters to begin a sentence and proper names
Read the following basic sight words: first, second, third, where, as, till, because, biggest, when
Substitute the following initial consonants: hard c, h, l, m, p, t, f, b, s, r
Sketch his bus route to school

At the following level your child should be taught to:

Level XI

Recognize selected consonants p, l
Substitute initial consonant g
Add to words indicating opposites
Recognize initial consonants j, v
Recognize initial consonant blends st, tr
Use place word: between
Use pronouns: him, her, them, his, their
Recognize the initial digraph: th
Use words that tell what kind

At the following level your child should be taught to:

Level XII

Recognize initial consonant blend br
Make inferences, logical conclusions, appropriate judgments
Substitute final consonants: t, p, m, l
Recognize 240 new basic sight words
Use contraction -'ll
Polish his oral reading skills

At the following level your child should be taught to:

Level XIII

- Recall a story in correct sequence
- Answer specific questions regarding story's details
- Distinguish between relevant and irrelevant information
- Identify final s and y sounds in words
- Identify syllables in words
- Point out an amount designated as most
- Write plural words ending in -es
- Finish incomplete sentences
- Identify likenesses in objects
- Repeat story in proper order
- Hear words starting with "pl"
- Use if in original sentences correctly
- Hear words beginning with "gr"
- Hear syllables in compound words
- Re-enact a story
- Point out vowels in alphabet
- Use enough in original sentences correctly
- Tell main idea of story in own words
- Circle pairs which are opposites and underline pairs which are the same
- Tell why actions occur
- Use figurative language
- Identify the digraph ch, ending ly, short a, short i, and initial consonant k
- Read a simple map

At the following level your child should be taught to:

Level XIV

- Identify the long vowel sounds of i, a, and e
- Hear syllables in 3 syllable words
- Write words with endings er and est
- Hear initial"sh" in words
- Tell if a story is make believe
- Hear initial "z" in words
- Arrange sentences into proper story sequence
- Write contractions ending in 'd
- Give simple definition of words
- Make up logical ending to a story
- Use the clue of silent e in reading words
- Identifies volumes of an encyclopedia according to number or alphabetical sequence
- Use of guide words in encyclopedia

At the following level your child should be taught to:

Level XV

- Match words to phrases meaning the same
- Hear short o in words
- Tell how characters feel in the story
- Correctly compare and contract two objects as to size, quality, weight and temperature
- Distinguish a summary of a paragraph from a small part of a paragraph
- Identify the sound of the initial consonant blends: dr, cl fl, bl, fr
- Identify the vowel digraph: oa
- Is aware of the ways that sounds can be written down
- Reorganize information gained from various resources
- Give a concise report orally or in written form

At the following level your child should be taught to:

Level XVI

Part One

- Use synomyns in sentences
- Tell logical conclusion of a story
- Hear long "u" vowel sound and unvoiced "th" consonant blend
- Recall details and characters of a story
- Hear initial consonant digraph: wh
- Hear final consonant digraphs: sh, ch
- Identify number of syllables in spoken words
- Use the word "syllable" correctly in his speaking
- Find answers from clues
- Spell 4 or more pairs of homonyms
- Hear the short "u" vowel and the final consonant "x"
- Tell why actions in story occur
- Hear final consonant digraph: ck and writes words ending in ck
- Hear the suffix: y on words
- Double final consonant before adding endings: ing, ed
- Predict outcomes of a story
- Hear final consonant blend: ng and substitutes ng ending other words
- Choose words in same class as an example
- Add word ending es to words ending in ch and sh
- Tell sketch of story from pictures
- Recognize map symbols

At the following level your child should be taught to:

Level XVI

Part Two

Write words ending in vowel: "y"
Hear initial consonant blend: "cr"
Hear consonant: "soft g"
Tell different meaning of same word, ex: *sticks*, *match*
Hear initial consonant blend: "sc"
Change "y" to "i" before adding "ed"
Choose correct -*'d* contractions (had, would)
Hear effect that "r" has when placed after vowels in a word ex: *for*, *store*, *car*, *far*, *finger*, *butter*, *third*, *shirt*, *stir*, *fur*, *burn*
Change "y" to "i" before adding "es"
Hear initial consonant blend: "sh"
Identify sentences having same or opposite meanings
Make judgements as to possible endings of a story and tells *why* he did
Hear dipthongs: "oy" and "oi" in words
Summarize details of story orally and in a drawing
Break sentences down into words that tell: *who did what*, *where* and *when*

Note silent vowel letters

At the following level your child should be taught to:

Level XVII

Part Three

Hear initial consonant blend: "sp"
Hear and write words containing vowel digraphs: "ay" (day) and "ea" (meat)
Hear and use final consonant blends: -*nt* and -*st* in words
Hear and see syllables in compound words
Hear final consonant digraph: unvoiced *th* in words
Use figurative language in an original oral story
Write words containing vowel digraph:-*ea*
Write words ending in consonant blend: -*nd*
Write a short play alone or with others and can dramatize it
Hear initial consonant blend: "qu" (quack)

At the following level your child should be taught to:

Level XVIII

- Say words correctly that contain dipthong: "ou"
- Write contractions ending in 've (have)
- Find words containing vowel digraph: "ow" (cow) and write them independently (eow)
- Hear and see syllables in two-syllable words with endings: -ing and -ly
- Write and correctly pronounce words containing vowel digraphs: "oo" (good) and "oo" (food)
- Retell story in own words
- Recall story facts
- Locate story details in text
- Read a map key

At the following level your child should be taught to:

Level XIX

- Use figurative language
- Arrange sentences in correct order
- Explain cause and effect relationships
- Explain that words that end with the sound of v are written with the letters ve
- Identify character traits
- Point out absurdities in sentence
- Identify the final consonants b, f, and z
- Respond to style and mood in poetry
- Identify sound for vowel digraph: au
- Note silent letters in words
- Identify the initial consonant blend: sl
- Define the uses of the Thesaurus
- Uses alphabetical sequences to locate words in a simple dictionary
- Use guide words in Thesaurus

At the following level your child should be taught to:

Level XX

- Identify clues for soft sound of c
- Note the effect of prefixes: un, pre, trans
- Locate the main ideas of a riddle

Differentiate between fact and fantasy
Identify the initial consonant blends: thr, tw, str, pr, and sk
Recognize propaganda in an advertisement, etc. on TV and newspaper
Interpret simple charts and graphic materials

At the following level your child should be taught to:

Level XXI

Interpret poetry
Explain that -ed may or may not add another syllable
Identify relevant details
Explain the sequence and results of events
Predict outcomes
Attack new words independently by using contextual and phonetic clues

At the following level your child should be taught to:

Level XXII

List the descriptive words that form sensory images
Identify and explain cause-effect relationships
Adapt techniques of word skill to unlock unknown words
Recognize the sound for the vowel digraph: ie
Use the hyphen with some compound words
Identify the initial consonant blends: gl, sw, sm, scr and spr
Identify transitional words, phrases or sentences (therefore, as a result, at the conclusion of the Civil War,------)
Identify the feelings and attitude of story characters
Explain the effectiveness of accented words in a sentence
Predict outcome through the emotional response of characters
Develop the ability to locate words in the dictionary
Distinguish between fanciful and realistic elements in a story
Use the possessive form its

At the following level your child should be taught to:

Level XXIII

Recognize the alphabetical of words according to the first two letters

Use the suffix en
Explain plot development and recall story facts
Identify consonant digraph: ph in initial and medial positions
Note the sound of the vowel digraph: ei and the consonant digraph: gh
Explain that the sound of f may be represented as f, ph and gh
Divide two syllable words between double consonants
State that the letters t and b may be silent letters
Use the initial consonant blends: spl and sk
Identify the use of alliteration, rhyme and poetry
Generalize that different letters may represent the same sound as the u or the oo
Reproduce the sound of the vowel digraph ew
Write their own stories and draw their own illustrations
Identify rhythm and form in poems

At the following level your child should be taught to:

Level XXIV

Locate words that show feelings and emotions of characters
Explain that certain letters represent the same sound -all (call), aw (crawl), and au (caught)
Identify idiomatic and figurative language
State that le at the end of a word is a clue to syllabication
Identify shr as an initial consonant blend
Reproduce the sound of the vowel digraph ey
Define the terms: fiction, non-fiction

APPENDIX B

THE RURAL SCHOOL MATH PROGRAM
(Similar to Urban School Program)

MATHEMATICS CONTENT AUTHORITY LIST: K-4
BASED ON LAIDLAW SERIES 1965 & 1968 EDITIONS

Topic I: Number Systems

A. Whole Numbers

1. Basic Concepts

0010 . . . . a. Definition: set of whole numbers

Ex. $\{0,1,2,3,4,5,6,\ldots\}$

0019 . . . . b. Developing cardinal number sense

Cardinal number expresses the manyness of a set; it tells how many elements are in a set.

Ex. $N\{a,b,c,d\} = 4 \quad N\{\ \} = 0$

0020 . . . . 1) Developing cardinal number zero

Level 4,9 Draw an X on each set whose number is zero

Level 15 If Jack gave his 5 rabbits away, what numeral would show how many rabbits he had left?

0030 . . . . 2) Developing cardinal numbers one through ten

Level 1,2,3,9 If there is just one object in a set, draw a ring around the set.

Level 6 Tell which number is shown by each counting man.

Level 15 Tell how you would show each of these counts on the ones counting man: three, five, eight, and nine.

Level 21 When you count, you use the counting numbers.

0035 . . . . 3) Developing cardinal numbers beyond ten

Level 6 Write a numeral for the number shown by the counting men.

Level 10 Draw the correct number of fingers on each set of men.

Level 15 For each of the number words or numerals below, draw a set of X's to show the number named.

0040 . . . . c. Developing ordinal number sense

An ordinal number indicates the position of an item in a sequence of items in contrast to a cardinal number which tells how many items are in a set.

Level 2,3,15

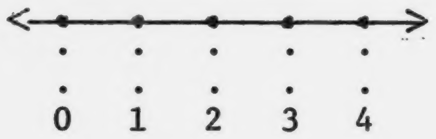
Ex. first, second, third; 4 o'clock (indicating the hour in a sequence of hours)

0050 . . . . d. Associating the idea of number with the number line (one-to-one correspondence)

A one-to-one correspondence is said to exist between two sets A and B if every member of set A can be paired with a member of set B and vice-versa.

Level 2,6,21

Ex.



Each number on the number line corresponds to one point on the line or each number is paired with one point on the line.

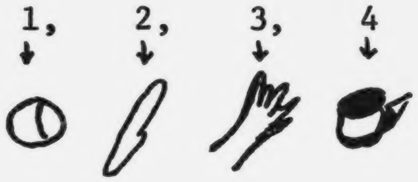
0060 . . . . e. Counting to find cardinal number of set (one-to-one correspondence)

Cardinal number - See 0019

One-to-one correspondence - See 0050

Level 1,2,6

Ex.

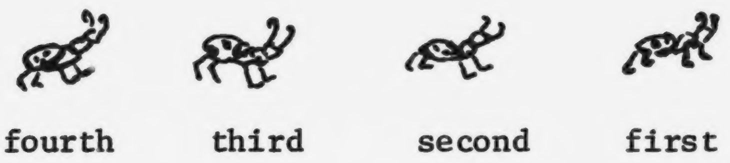


0070 . . . . f. Ordinal counting

Ordinal number - See 0040

Level 3,9,15

Ex.



0075 . . . . . . g. Sequence of numbers increasing by one

Level 3,4,5,
6,21
Ex. 1,2,3,...,
14,15,16,17,...,
31,32,33,...,

0080 . . . . . . h. Skip counting

Level 6,8,14,
15,22
Ex. 2,4,6,8,...; 5,10,15,...; 5,8,11,14,....

0090 . . . . . . i. Other counting: backward, rote, etc.

Level 4,6,8,
13,14
Ex. Backward: 9,8,7,6,..., 50,40,30,....

Rote: 1,2,3,4,5, I caught a hare alive.
6,7,8,9,10 I let him go again.

0100 . . . . . . j. Ordering numbers as greater than, less than, equal to or not equal to, and between, and objects as fewer than or more than

Level 1,2,9,
15
Ex. $7>2$; $5<9$; $3 + 1 = 4$; $2 \times 7 \neq 15$

7 apples are more than 5 apples.

A dog has fewer eyes than legs.

2. Operations

a. Addition

1) Properties

0110 . . . . a) Addition, a binary operation

(1) A binary operation is an operation on two elements in a set to produce a third element belonging to the set.

(2) The binary operation of addition combines two numbers to obtain a unique result.

Ex. $2 + 3 = 5$

The number 2 and the number 3 are combined to obtain the number 5.

0120 . . . . b) Addition developed from union of disjoint sets or joining action

Level 1,2,4,5,
9,10,15,
16,19,21

Disjoint sets are sets which have no elements in common.

Ex. {△, ○, ▭} and {▯ ▲} are disjoint sets

{△, ○, ▭} ∪ {▯, ▲} = {△, ○, ▭, ▯, ▲}

The union of the two disjoint sets forms a new set.

N{▲, ○, ▭} + N{▯, △} = N{△, ○, ▭, ▯, ▲}

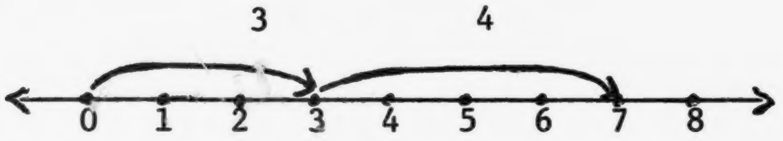
Adding the numbers of the two sets gives the number of the new set.

3 + 2 = 5 (adding the cardinal numbers of the sets).

0130 . . . . c) Addition developed from number line

Level 2,5,6,7,
10,16

Ex.



3 + 4 = 7

Note: Some authorities prefer to use straight lines rather than curved lines.

0140 . . . . d) Closure, a property of addition

A binary operation with numbers such that the resulting number is always a member of the set being considered is said to be closed under that operation.

Since for every pair of numbers in the set of whole numbers, the unique sum is also in that set, closure is a property of addition of whole numbers.

Ex. A = 1,2,3,4,...

6 + 99 = 105

6,99 and 105 are all numbers of set A

Ex. B = 1,3,5,7...

3 + 5 = 8

8 is not in set B

Closure is not a property of the addition of odd numbers.

0150 . . . . e) Commutativity, a property of addition

(1) Commutativity is another term for the commutative property.

(2) A binary operation is said to possess commutativity if the result of combining two elements is independent of the order.

(3) The commutative property is sometimes called the order property.

Level 4,15,19

Ex. The operation of addition of whole numbers possesses commutativity since

$$2 + 3 = 3 + 2 = 5$$

0160 . . . . f) Associativity, a property of addition

(1) Associativity is another name for the associative property.

(2) An operation is said to possess associativity if the result of combining three elements by this operation is independent of the way in which the elements are combined.

(3) The associative property is sometimes called the grouping property.

Level 7,8,11,15, 19,21

Ex. The operation of addition of whole numbers is associative.

$$5+2+1 = (5+2)+1 = 5+(2+1)$$

$$7 + 1 = 5 + 3$$

$$8 = 8$$

$$a + b + c = (a+b) + c = a + (b+c)$$

0170 . . . . g) Zero, the identity element in addition

The identity element in addition is the number which when added to any number leaves that number unchanged.

Level 4,5,7,10,15,21

Ex. $3 + 0 = 0 + 3 = 3$

$n + 0 = 0 + n = n$

0 is the identity element for addition.

0180 . . . . h) Role of one in addition

Level 6,9

When 1 is added to a whole number the sum is the next greater whole number.

Ex. $23 + 1 = 24$ $102 + 1 = 103$

2) Computation

a) Two addends

0190 . . . .(1) Elementary facts of addition

An elementary (basic) fact of addition has two whole number addends, each less than ten.

Level 4,5,7,10,11,
15,16,17,21

Ex. $6 + 7 = 13$

0200 . . . .(2) Multi-digits used in addition without renaming

Renaming in addition means considering ones as ones and tens, or tens as tens and hundreds, etc.

Level 8,11,13,16,17,
21,22,25

Ex.

$$\begin{array}{r} 213 \\ +\ \underline{142} \\ 355 \end{array}$$

No renaming is necessary. See 0210 for an example using renaming (in some texts called regrouping or carrying in addition.

0210 . . . .(3) Multi-digits used in addition with renaming

Level 11,12,13,14,16,17,
18,19,20,21,22,25,
26

Ex.

$$\begin{array}{rcrcrcr} 337 & = & 300 & + & 30 & + & 7 \\ +\,\underline{184} & = & \underline{100} & \underline{+} & \underline{80} & \underline{+} & \underline{4} \\ & & 400 & + & 110 & & +11 \end{array}$$

$$400 + (100 + 10) + (10 + 1) =$$

$$(400 + 100) + (10 + 10)+1 = 521$$

The 11 ones are renamed as 1 ten and 1 one. The 11 tens are renamed as 1 hundred and 1 ten. The tens are combined and the hundreds are combined giving 521.

(b) More than two addends

0223 . . . .(1) Single digits used in addition without renaming

Level 8,10,13,15,16,
18,21

Ex.

$$\begin{array}{r} 3 \\ 2 \\ +\underline{4} \end{array} \qquad 5 + 6 + 4 = ?$$

3+2+4 does not use renaming since neither 5+4 nor 6+3 uses renaming. 5+6+4 does not use renaming since in neither 11+4 nor 5+10 do the ones need to be renamed.

0225 . . . .(2) Single digits used in addition without renaming

Level 13,20,21

When the addition fact used is greater than 9+9 renaming will be needed.

Ex.

$$\begin{array}{r} 8 \\ 9 \\ 5 \\ +\ \underline{3} \end{array}$$

Adding down 17+5 will use renaming even though addition may be done by considering the ending for the basic fact 7+5. That is, 12 will be renamed as 1 ten and 2 ones.

0227 . . . . (3) Multi-digits used in addition without renaming

Level 12,16,21,23

Ex.

$$\begin{array}{rr} 213 & 313 \\ 141 & 241 \\ +\ \underline{234} & +\ \underline{631} \\ 588 & 1185 \end{array}$$

The ones do not need to be renamed as tens and ones. The tens do not need to be renamed as hundreds and tens.

0229 . . . . (4) Multi-digits used in addition without renaming

Level 12,13,16,18,19,
20,21,22,23,24,25

Ex.

$$\begin{array}{r} 427 \\ 356 \\ +\ \underline{485} \\ 1268 \end{array}$$

18 ones must be considered as 1 ten and 8 ones, 16 tens as 1 hundred and 6 tens, etc.

b. Subtraction

1) Properties

0240 . . . . a) Subtraction, a binary operation

Binary operation - See 0110

0250 . . . . b) Subtraction developed in relation to subsets or separating action

Level 1,2,3,4,7,
10,16,19,21

Ex. Pennies

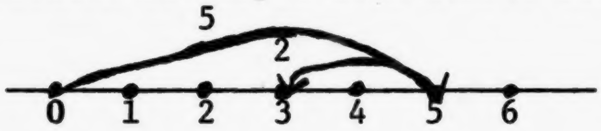
Separate one penny from the set of 5 pennies.

5 - 1 = 4

0260 . . . . c) Subtraction developed from number line

Level 5,7,8,10,16,21

Ex.



5 - 2 = 3

0270 . . . . d) Subtraction, the inverse of addition (relationship of addition and subtraction)

An inverse operation is one which undoes another operation, as standing is the inverse of sitting and sitting is the inverse of standing.

Level 5,7,10,13,15,16,21

Ex. $8 + 3 = 11$ and $11 - 3 = 8$

Adding the number 3 to the number 8 gives the sum 11 ($8 + 3 = 11$).

Subtracting the number 3 from the sum 11 gives the missing addend 8 ($11 - 3 = 8$).

Subtraction is the inverse of addition.

0280 . . . . e) Role of zero in subtraction

Level 4,5,10,15

Ex. $8 - 0 = 8$ $n - 0 = n$

Zero is the righthand identity element for subtraction

$8 - 8 = 0$ $n - n = 0$

Any number subtracted from itself is zero

0290 . . . . f) Nonclosure, noncommutativity, nonassociativity of subtraction of whole numbers

Closure - See 0140
Commutativity - See 0150
Associativity - See 0160

if A = 1,2,3,4,... and the operation is subtraction, then closure is not a property of the operation.

Ex. $3 - 8 = {}^{-}5$ but ${}^{-}5$ is not a member of set A.

Commutativity is not a property of subtraction.

Ex. $7 - 3 \neq 3 - 7$ since $4 \neq {}^{-}4$

Associativity is not a property of subtraction.

Ex. $(9-2)-1 \neq 9 - (2-1)$ since
$7 - 1 \neq 9 - 1 \quad 6 \neq 8$

0300 . . . . g) Role of one in subtraction

Subtracting 1 from a whole number gives the next lesser number.

Level 3,4 — Ex. $7 - 1 = 6 \qquad 36 - 1 = 35$

2) Computation

0310 . . . . a) Elementary facts of subtraction

An elementary (basic) fact of subtraction has two whole number addends, known and missing, each less than ten.

Level 4,5,7,10,11,15,
16,17,18,20,21

Ex. $16 - 9 = 7 \qquad 16 - \square = 7$
$16 - \square = 9$
$16 - 9 = \triangle$

The addends 9 and 7 are both less than 10.

0320 . . . . b) Multi-digits used in subtraction without renaming

Renaming in subtraction means to consider 1 ten as 10 ones or one hundred as 10 tens, etc.

Level 8,11,13,17,18,
19,21,22,25

Ex.

$$\begin{array}{r} 47 \\ -\underline{23} \\ 24 \end{array}$$

No renaming is necessary

0330 . . . . c) Multi-digits used in subtraction without renaming

0330 (cont'd)

Level 11,12,13,14,17,
18,19,20,21,22,
23,24,25,26

Ex. 52
- 25

5 tens and 2 ones may be renamed as 4 tens + 12 ones

then 40 + 12
-(20 + 5
20 + 7 or 27

c. Multiplication

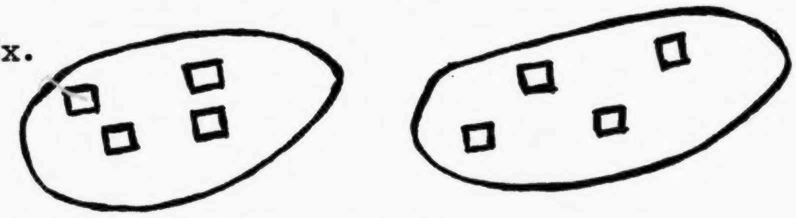
1) Properties

0340 . . . . a) Multiplication, a binary operation

Binary operation - See 0110

0350 . . . . b) Multiplication developed from union of two or more equivalent sets

Ex.



Two sets of 4 are equivalent to one set of 8
Two 4's are 8
2 X 4 = 8

0360 . . . . c) Multiplication developed from arrays

An array is an orderly arrangement of objects in rows and columns.

Level 13

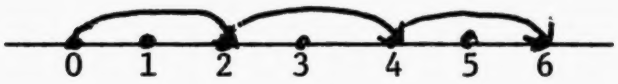
Ex. . . . .
. . . .
. . . .

3 fours are 12 or 3 x 4 = 12

0370 . . . . d) Multiplication developed from the number line

Level 14,19,22

Ex.



Three 2's are 6

3 x 2 = 6

0380 . . . . e) Multiplication developed as repeated addition

Level 13,14,19,22

Ex. 4 + 4 + 4 = 12

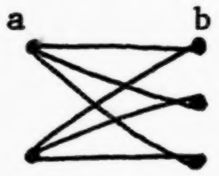
The sum of three 4's is 12

3 x 4 = 12

0390 . . . . f) Multiplication developed from Cartesian product sets

Cartesian product sets - See 4160

Ex.



How many dots in column a? in column b? Connect each dot in a with every dot in b. How many line segments did you draw? (6)

The first dot in column a is connected with 3 dots in column b by 3 different line segments. The second dot in column a is connected to the same 3 dots in column b by 3 different line segments. Together the dots are connected by 2 x 3 or 6 ways.

0400 . . . . g) Closure, a property of multiplication

Closure - See 0140

Ex. 12 x 25 = 300

12, 25 and 300 are all numbers in the set of whole numbers.

0410 . . . . h) Commutativity, a property of multiplication

Commutativity - See 0150

Level 19,22

Ex. 2 x 3 = 3 x 2 = 6 a x b = b x a

The product is independent of the order of the factors.

0420 . . . . i) Associativity - See 0160

Level 24

Ex. $3 \times 2 \times 1 = (3 \times 2) \times 1 = 3 \times (2 \times 1)$
$a \times b \times c = (a \times b) \times c = a \times (b \times c)$

The product is independent of the way in which the factors are associated.

0430 . . . . j) Distributivity, a property of multiplication over addition or subtraction

(1) Distributivity is another name for the distributive property.

(2) An operation is said to possess distributivity if when performed on a set of quantities the result is equal to performing the operation on the individual members of the set and combining the results.

Multiplication is distributed over addition or subtraction

Level 20,22

Ex. $4 \times (3+2) = (4 \times 3)+(4 \times 2) = 12+8=20$ and $4 \times 5 = 20$
$4 \times (3-1) = (4 \times 3)-(4 \times 1) = 12-4=8$ and $4 \times 2 = 8$

$a \times (b+c) = ab + ac$

0440 . . . . k) One, the identity element in multiplication

Identity element - See 0170

1 is the identity element for multiplication because multiplying a number by 1 leaves that number unchanged.

Level 13,19,20,22

Ex. $5 \times 1 = 1 \times 5 = 5$

$1 \times 3 = 3 \times 1 = 3$

$n \times 1 = 1 \times n = n$

0450 . . . . l) Property of zero in multiplication

Any number times zero equals zero

Level 14

Ex. $5 \times 0 = 0 \times 5 = 0$

$n \times 0 = 0 \times n = 0$

0450 (cont'd)

2) Computation

a) Two factors

0460 . . . . (1) Elementary facts of multiplication

An elementary (basic) fact of multiplication has two whole number factors, each less than 10.

Level 14,19,20,22

Ex. 5 x 7 = 35

0470 . . . . (2) Multi-digits used in multiplication without renaming

Renaming in multiplication means considering ones as tens and ones, tens as hundreds and tens, etc.

Level 20,22,23,24

Ex.

$$\begin{array}{r} 32 \\ \times\ 3 \\ \hline 96 \end{array} \qquad \begin{array}{r} 43 \\ \times\ 3 \\ \hline 129 \end{array}$$

There is no need to consider ones as tens and ones nor tens as hundreds and tens.

0480 . . . . (3) Multi-digits used in multiplication with renaming

Level 20,22,23,24,25,26

Ex.

$$\begin{array}{r} 45 \\ \times\ 7 \\ \hline 315 \end{array} \qquad \begin{array}{r} 40+5 \\ \times\ 7 \\ \hline 280+35 \end{array} =$$

$$280+(30+5) =$$

$$(280+30)+5 =$$
$$310+5 = 315$$

Note than 35 was considered as 3 tens + 5. 3 tens were then added to 28 tens.

0490 . . . . b) Multiplication with more than two factors, without renaming

0490 (cont'd)

Ex. 2 x 3 x 4

2 x 3 x 9

1 x 2 x 3 x 4

Only elementary facts are used.

0500 . . . . c) Multiplication with more than two factors, with renaming

Level 25,26

Ex. $6 \times 3 \times 9 = (6 \times 3) \times 9 = 6 \times (3 \times 9)$

$18 \times 9 = 6 \times 27$

$162 = 162$

When 8 is multiplied by 9 the 72 must be considered as 7 tens and 2 ones and 7 tens combined with 9 tens; or when 7 is multiplied by 6 the 42 must be considered as 4 tens and 2 ones and the 4 tens added to 12 tens.

0510 . . . . d) Multiples of ten as a factor

Multiples of 10 are numbers which have a factor of 10 such as 10, 20, 60, 120.

Level 20,22,24,25

Ex.

$$\begin{array}{r} 12 \\ \times\ 10 \\ \hline 120 \end{array} \qquad \begin{array}{r} 13 \\ \times\ 20 \\ \hline 260 \end{array} \qquad \begin{array}{r} 25 \\ \times\ 60 \\ \hline 1500 \end{array}$$

0515 . . . . e) A power of ten as a factor

Level 20,25

Ex. 100 x 15 = 1,500

1000 x 23 =23,000

0520 . . . . f) A number expressed in exponential form as a factor

An exponent is a small numeral written above and to the right of a base numeral. When the exponent is a whole number it shows how many times the base is used as a factor.

0520 (cont'd)

Ex. $4^3 \times 5 = 4 \times 4 \times 4 \times 5$

$a^2 \times a^3 = a^{2+3} = a^5$

$6^2 \times 6^3 = 6^5$

$81 \times 3^3 = 3^4 \times 3^3 = 3^7$

$9^2 \times 3^3 = 3^2 \times 3^2 \times 3^3 = 3^7$

d. Division

1) Properties

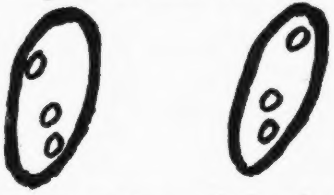
0530 . . . . a) Division, a binary operation

Binary operation - See 0110

0540 . . . . b) Division developed from partitioning into equivalent sets

Level 22

Ex.



How many sets of 3 objects each can be formed from 6 objects or if six objects are separated into two equivalent sets how large will each set be?

0550 . . . . c) Division developed as successive subtraction

Level 19,20,23

Ex.

$$\begin{array}{r} 12 \\ -\ \underline{4} \\ 8 \\ -\ \underline{4} \\ 4 \\ -\ \underline{4} \\ 0 \end{array}$$

In the total operation 4 was subtracted 3 times with no remainder. There are three 4's in 12 or 12 ÷ 4 = 3.

0555 . . . . d) Division developed from arrays

Arrays - See 0360

Ex. . . . .

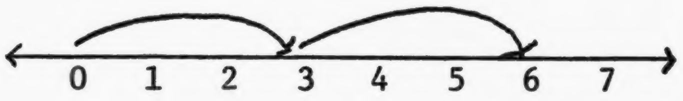
. . . .

If an array of 8 members is arranged with 4 to a row how many rows will there be? 8 ÷ 4 = 2; or if any array of eight members is arranged in two rows how many items will be in each row? 8 ÷ 2 = 4.

0560 . . . . e) Division developed from the number line

Level 19,22

Ex.



How many 3's are there in 6?

6 ÷ 3 = 2

0570 . . . . f) Division, the inverse of multiplication

Inverse - See 0270

Level 20,22,23

Ex. If 4 x n = 12

than 12 ÷ 4 = (that same number)

0575 . . . . g) Distributivity of division over addition or subtraction

Ex. (4+8) ÷ 2 = (4÷2) + (8÷2) =

12÷2 = 6 and 2+4 = 6

Level 20,23

Ex. (8-2) ÷ 2 = (8÷2) -(2÷2) =
6÷2 = 3 and 4 - 1 = 3

The distributivity of division holds only when the operation of addition or subtraction precedes the divisor.

0580 . . . . h) Role of one in division

Level 19,20

Ex. 12÷1 = 12; n÷1 = n

1 is the right hand identity element for division

12÷12 = 1; n÷n = 1

Any number except 0 divided by itself equals 1.

0590 . . . . i) Zero not a divisor

What number could equal a number divided by zero?
$\frac{n}{0}$ = ? Could $\frac{6}{0}$ = 0? Since division is the inverse of multiplication then 0 x 0 would have to equal 6. This we know is not true. No number times 0 will = 6 and no number times 0 will = n. Therefore, division by zero is an undefined operation.

0600 . . . . j) Nonclosure, nocommutativity, nonassociativity of division

Closure - See 0140
Commutativity - See 0150
Associativity - See 0160

If A = $\{1,2,3,4,\ldots\}$ and the operation is division, then

Closure is not a property of division since 3÷12 = 1/4, but 1/4 is not a member of set A.

Commutativity is not a property of division since 12÷3 ≠ 3÷12 as 4 ≠ 1/4.

Associativity is not a property of division since (24÷8)÷2 ≠ 24÷(8÷2) as
3÷2 ≠ 24÷4
3/2 ≠ 6

2) Computation

0610 . . . . a) Elementary facts of division

In elementary (basic) facts of division, both the known factor (divisor) and unknown factor (quotient) are whole numbers each less than ten.

Level 19,20,22,23
24,25,26 — Ex. $4/\overline{32}$ or $32 \div 4 = 8$

0620 . . . . b) Division: known factor (divisor), less than ten, product (dividend) not renamed; no remainder.

The dividend is not renamed if each digital value in the dividend is a multiple of the divisor.

Level 20,23,24,25,26 — Ex. $2/\overline{4682}$; $4/\overline{484}$; $4/\overline{1248}$

Level 20,24 — $\frac{1}{2}$ of 50 =

Level 20,23,24,25 — $50 \div 5 =$

Level 20,23,24,25 — $69 \div 3 =$

Level 24,25 — $40 \div 2 = n$

Level 24,25,26 — $66 \div 2 = n$

Level 25,26 — $n \times 400 = 800$

Level 25 — $\$.04/\overline{\$2.00}$

0630 . . . . c) Division - known factor (divisor) is less than ten and the product (dividend) is not renamed; remainder

Level 20,22,23,24,25,26 — Ex. $\begin{array}{r}\underline{11\text{ r }2}\\4/\ 46\end{array}$ $\begin{array}{r}\underline{8\text{ r }1}\\4/33\end{array}$

Level 20 — $5 \div 2 =$ ___, remainder ___

Level 20 — $13 \div 3 = \boxed{}$

Level 23,24,25 — $96 \div 9 = n$

Level 25 — $3/\overline{\$15.95}$

0640 . . . . d) Division - known factor (divisor) less than ten, product (dividend) renamed; no remainder.

Level 23,24,25,26 Ex. $\begin{array}{r} 32 \\ 8\overline{)256} \end{array}$ $\begin{array}{r} 13 \\ 4\overline{)\ 52} \end{array}$

The dividend is renamed as 25 tens and 6 ones and then as 24 tens and 16 ones.

Level 24 At another station Bob's father paid $2.56 for 8 gallons of gasoline. What was the price of each gallon?

Level 25 $n \times 2 = 1142$

Level 25, 26 $3405 \div 5 = n$

Level 25, 26 $7\overline{)\$90.23}$

0650 . . . . e) Division - known factor (divisor) less than ten, product (dividend) renamed; remainder

Level 23,24,25,26 Ex. $\begin{array}{r} 32 \text{ r } 1 \\ 8\overline{)\ 257} \end{array}$

Two hundreds, five tens are renamed as 25 tens, then 24 tens are 17 ones.

Level 24,25,26 $739 \div 8 = n$

Level 25,26 $4\overline{)\ \$86.49}$

Level 26 $3902 \div n = 4 \text{ r } 2$

0660 . . . . f) Division by ten or greater numbers

Ex. $\begin{array}{r} 3 \\ 10\overline{)30} \end{array}$ $\begin{array}{r} 21 \\ 26\overline{)546} \end{array}$

$\begin{array}{r} 178 \text{ r } 33 \\ 296\overline{)52721} \end{array}$

0665 . . . . g) Division by multiples of ten

Ex. $\begin{array}{r} 25 \\ 10\overline{)250} \end{array}$; $\begin{array}{r} 41 \\ 40\overline{)1640} \end{array}$; $\begin{array}{r} 5 \\ 300\overline{)1500} \end{array}$;

$\begin{array}{r} 62 \text{ r } 86 \\ 120\overline{)\ 7526} \end{array}$

0665 (cont'd)

Note: If a text develops division as a series of subtractions the same type division exercises will be used though renaming as shown in 0640 will not be used.

The examples used in 0620 through 0665 might be solved as follows:

See 0620 -

Ex. $$\begin{array}{r} \underline{121} \\ 1 \\ 20 \\ \underline{100} \\ 4/484 \\ \underline{400} \\ 84 \\ \underline{80} \\ 4 \\ \underline{4} \end{array}$$

See 0630 -

Ex. $$\begin{array}{r} \underline{11r2} \\ 1 \\ \underline{10} \\ 4/46 \\ \underline{40} \\ 6 \\ \underline{4} \\ 2 \end{array}$$

See 0650 -

Ex. $$\begin{array}{r} \underline{32r1} \\ 2 \\ \underline{30} \\ 8/257 \\ \underline{240} \\ 17 \\ \underline{16} \\ 1 \end{array}$$

See 0660 -

Ex. $$\begin{array}{r} \underline{21} \\ 1 \\ \underline{20} \\ 26/546 \\ \underline{520} \\ 26 \\ \underline{26} \end{array}$$

See 0665 -

Ex. $$\begin{array}{r} \underline{25} \\ 5 \\ \underline{20} \\ 10/250 \\ \underline{200} \\ 50 \\ \underline{50} \end{array}$$

0667 . . . . h) Division by powers of ten

Ex. $263 \div 100 = 2 \text{ r } 63$

$4256 \div 1000 = 4 \text{ r } 256$

$5000 \div 100 = 50$

0670 . . . . i) Division with numbers expressed in exponential form

Exponents - See 0520

Ex. $10^5 \div 10^2 = 10^3$

$4^6 \div 4^2 = 4^4$

Use code 0670 only when exponents and bases are positive integers.

e. Combined operation (addition, subtraction, multiplication, division)

0680 . . . . 1) Two sequential operations

Level 22,23,24,
25,26

Ex. $4 + 8 \div 2 = ?$

Parentheses should clarify such an example.

$4 + (8 \div 2) = 4 + 4 = 8$

$(4 + 8) \div 2 = 12 \div 2 = 6$

$(4 \times 7) + 7 = n \quad (35 + 7) - 4 = n$

$8 \times (6+8) = n \quad n \div (3 \times 3) = 8$

$n \times (15-6) = 63 \quad n = (5280 \div 6) \times 5$

This code should not be used for example such as:

a)

$$\begin{array}{r} 32 \\ \underline{\times 18} \end{array}$$

though both multiplication and addition are used.

b)

$28\overline{)5656}$ though division, multiplication and subtraction are used.

0690 . . . . 2) More than two sequential operations

See explanation 0680

Ex. $(4 \times 8) - 5 + (8 \div 2) =$

$32 - 5 + 4 = 31$

0700 . . . . f. Raising to powers and finding roots

Ex. $4^3 = 4 \times 4 \times 4 = 64$

A square root of 25 is 5

Note: Only whole numbers can be used in code 0700 since this topic is part of the major topic Whole Numbers. See 0004.

The square root of 25 is not considered as $25^{\frac{1}{2}}$. See 3120.

If the notation not operation is being developed, code 3120.

B. Nonnegative Rational Numbers (fractional numbers)

1. Basic Concepts

1000 . . . . a. Definition: set of nonnegative rationals (fractional numbers)

A nonnegative rational number is a number that can be expressed as the ratio of two whole numbers, provided that the second number (the divisor) is not zero.

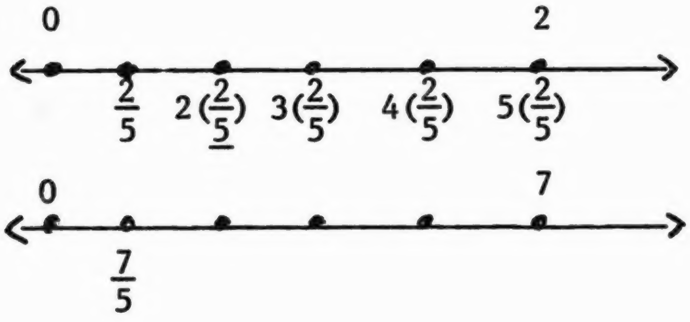
Ex. $\frac{3}{4}$; $\frac{a}{b}$ when $b \neq 0$

Note: When nonnegative rational numbers are considered, the term fractional number will be used. When numerals are considered, the term fraction will be used in the content list.

1005 . . . . b. Developed in terms of basic operation

Level 20,25

Ex.



1005 (cont'd)

$$0, \frac{7}{5}, ? \times \frac{7}{5}, ? \times \frac{7}{5}, ? \times \frac{7}{5}, ? \times \frac{7}{5}$$

$5 \times \frac{7}{5} = ?$

$\frac{7}{5}$ is $7 \div ?$

$7 \div 5$ is ?

1010 . . . . c. Developed from subset of a given set

Level 13, 24

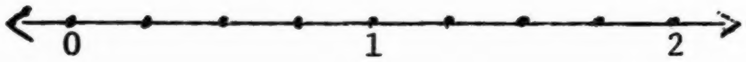
Ex. {● ○ ○ ○}

Note the set of four circles. How many are shaded? When 1 out of 4 is shaded we say 1/4 of the circles are shaded. Which numeral shows the total number of circles? Which shows the number shaded?

1020 . . . . d. Developed as distances on the number line

Level 20,23, 24,26

Ex.

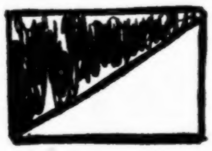


We can pair names for fractional numbers with points on the number line. What is the name of a point half-way between 0 and 1? Let us count by halves o/2, 1/2, 2/2, 3/2, 4/2. Divide the space from 0 to 1 into fourths and count by fourths. When we write 3/4 which numeral tells the number of equal parts into which the unit distance was divided? Which numeral tells the number of parts being considered?

1030 . . . . e. Developed from plane and solid regions

Level 5,13,24

Ex.



Into how many equal parts is the square shape divided? How many parts are shaded? What part of the whole is shaded? 1 of the 2 equal parts is shaded or 1/2 of the whole is shaded. Circular shapes, candy bars, cups, etc. are often used to show fractional parts of a whole.

1035 . . . . f. Developed in other ways

Level 1,2,5,17

1040 . . . . g. Whole numbers as related to set of nonnegative rationals (fractional numbers)

The set of nonnegative rational numbers includes the set of whole numbers which may be written in fraction form $\frac{a}{b}$; a and b are whole numbers, a is a multiple of b and b is not zero.

Level 24

Ex. $\frac{8}{2} = 4$; $\frac{12}{4} = 3$; $\frac{10}{2} = 5$; $\frac{6}{6} = 1$

1060 . . . . h. Definition: equality

Rational numbers which have the same value are equal.

Level 24

Ex. The value of the fractional numbers $\frac{3}{8}$ and $\frac{6}{16}$ is the same.

1080 . . . . i. Counting

Ex. $\frac{1}{8}, \frac{2}{8}, \frac{3}{8}, \frac{4}{8}, \frac{5}{8}, \ldots$

.2, .3, .4, .5, .6, . . .

1090 . . . . j. Ordering: greater than; less than; not equal to; between

Equality - See 1060

Ex. $\frac{a}{b} > \frac{c}{d}$ if $ad > bc$ $\qquad \frac{2}{3} > \frac{7}{12}$

$\frac{a}{b} < \frac{c}{c}$ if $ad < bc$ $\qquad \frac{7}{8} < \frac{11}{12}$

$\frac{a}{b} = \frac{c}{d}$ if $ad = bc$ $\qquad \frac{2}{3} = \frac{4}{6}$

$\frac{1}{2} \square \frac{1}{3} \square \frac{1}{4}$ $\qquad \frac{7}{8} \square \frac{5}{6}$

1100 . . . . k. Density

Density is a term characterizing any ordered sequence of elements such that between any two elements of the sequence another element exists. Fractional numbers have density because between any two fractional numbers another fractional number exists.

Ex.

Between $\frac{5}{10}$ and $\frac{6}{10}$ there exists another fractional number, such as $\frac{51}{100}$; between $\frac{5}{10}$ and $\frac{51}{100}$ there exists another fractional number, such as $\frac{101}{200}$; etc.

Between .8 and .9 there exists another decimal number, .81; between .8 and .81 there exists another decimal number, .807; etc.

2. Operations

a. Addition

1) **Properties**

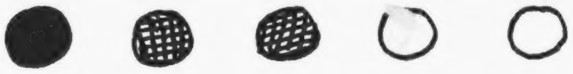
1110 . . . . a) Addition, a binary operation

Binary operation - See 0110

Ex. $\frac{1}{a} + \frac{3}{4} = ?$

$.45 + 2.13 = ?$

1120 . . . . b) Addition developed from union of disjoint sets



What part of the set of all the circle shapes is black? shaded? What part is colored in some way? Write a number sentence to show it.

$\frac{1}{5}$ $\frac{2}{5}$ $\frac{3}{5}$

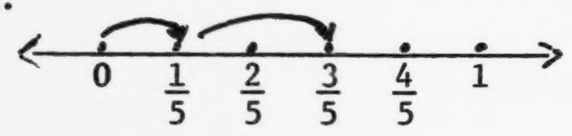
For decimal fractions use 10 shapes

1130 . . . . c) Addition developed from the number line

$$\frac{1}{5}+\frac{2}{5}=\frac{3}{5}$$

Level 26

Ex.



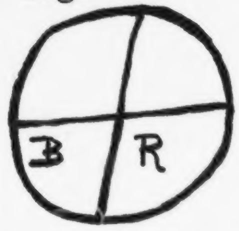
We can add fractional numbers with the same demoninators as we added whole numbers

$$\frac{1}{5}+\frac{2}{5}=\frac{3}{5}$$

How shall we show the jumps? What is the denominator of the sum? How can you find the numerator of the sum?

1140 . . . . d) Addition developed from plane or solid regions

Ex.



What part of the circular shape is red? blue? What part is colored?

$\frac{1}{4}+\frac{1}{4}=\frac{2}{4}$. What does the 4 tell us? the 2? How could 2 be found from the numerators? Why must the 4 be used for all denominators? (It tells into how many equal parts the whole is separated).

1150 . . . . e) Closure, a property of addition

Closure - See 0140

Ex. $\frac{2}{3}+\frac{3}{8}=\square$

$$\frac{16}{24}+\frac{9}{24}=\frac{25}{24}$$

$$.3+.5=.8$$

1160 . . . . f) Commutativity, a property of addition

Commutativity - See 0150

Ex. $\frac{2}{3}+\frac{1}{4}=\frac{1}{4}+\frac{2}{3}=\frac{11}{12}$

$.3+.5=.5+.3=.8$

1170 . . . . g) Associativity, a property of addition

Associativity - See 0160

$\left(\frac{1}{4}+\frac{1}{3}\right)+\frac{1}{2}=\frac{1}{4}+\left(\frac{1}{3}+\frac{1}{2}\right)$

$\frac{7}{12}+\frac{1}{2}=\frac{1}{4}+\frac{5}{6}$

$\frac{7}{12}+\frac{6}{12}=\frac{3}{12}+\frac{10}{12}=\frac{13}{12}$

$.3+(.25+.4)=(.3+.25)+.4$

$.3+.65=.55+.4=.95$

1180 . . . . h) Zero, the identity element in addition

Identity element - See 0170

Ex. $\frac{2}{3}+0=0+\frac{2}{3}=\frac{2}{3}$

$.4+0=0+.4=.4$

2) Computation

1190 . . . . a) Addition with common fraction notation, equal denominators (like fractions)

Level 21

Ex. $\frac{3}{8}+\frac{1}{8}=\frac{4}{8}$ or $\frac{1}{2}$

$$\begin{array}{r} \frac{3}{8} \\ +\frac{1}{8} \\ \hline \frac{4}{8}\text{or}\frac{1}{2} \end{array}$$

1190 (cont'd)

$$\begin{array}{r} 3 \\ +\ \frac{1}{4} \\ \hline 3\frac{1}{4} \end{array} \qquad \begin{array}{r} 5\frac{1}{7} \\ +\ 2\frac{3}{7} \\ \hline 7\frac{4}{7} \end{array} \qquad \begin{array}{r} 6 \\ 98\frac{1}{8} \\ 127\frac{3}{8} \\ +\ \frac{5}{8} \\ \hline 231\frac{9}{8} \text{ or } 232\frac{1}{8} \end{array}$$

1200 . . . . b) Addition with common fraction notation, unequal denominators (unlike fractions)

Ex. $\frac{2}{3} + \frac{1}{2} = \frac{4}{6} + \frac{3}{6} = \frac{7}{6}$ or $1\frac{1}{6}$

or

$$\begin{array}{rcr} \frac{2}{3} & = & \frac{4}{6} \\ \frac{1}{2} & = & \frac{3}{6} \\ \hline & & \frac{7}{6} \text{ or } 1\frac{1}{6} \end{array}$$

$$\begin{array}{r} 12\frac{7}{8} \\ +\ 6\frac{3}{4} \\ \hline 19\frac{5}{8} \end{array} \qquad \begin{array}{r} \frac{3}{8} \\ \frac{2}{3} \\ +\ \frac{1}{6} \\ \hline 1\frac{5}{24} \end{array}$$

1210 . . . . c) Addition with exact decimal fraction notation

Ex. $.5 + .25 = .75$ or $\begin{array}{r} .50 \\ +.25 \\ \hline .75 \end{array}$ (since $.5 = .50$)

$$\begin{array}{r} .121 \\ .342 \\ +.514 \\ \hline .977 \end{array} \qquad \begin{array}{r} 30.7 \\ 485.2 \\ +\ 1.96 \\ \hline 517.86 \end{array}$$

Do not use this code with addition involving money. Use 6040 and appropriate code under addition of whole numbers.

b. Subtraction

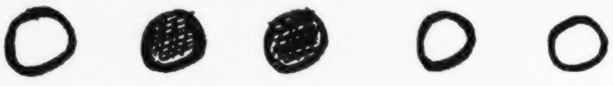
1) Properties

1220 . . . . .a) Subtraction, a binary operation

Binary operation - 0110

1230 . . . . .b) Subtraction developed in relation to subsets

Ex.



What part of the set of all the circular shapes is 1 circular shape? 2? 3? 4? 5? What part of the shapes is shaded? Can we find the part not shaded by subtracting? How?

$\frac{5}{5} - \frac{2}{5} = \frac{3}{5}$. Check your answer by counting.

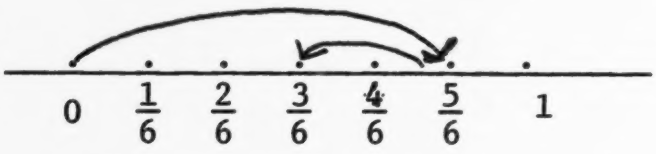
$\frac{1}{5}$, $\frac{2}{5}$, $\frac{3}{5}$ not shaded. For decimal fractions use

10 shapes $\frac{10}{10} - \frac{4}{10} = \frac{6}{10}$ or 1 - .4 = .6

1240 . . . . .c) Subtraction developed from the number line.

Level 26

Ex.



Count the parts shown on the number line. Subtract $\frac{2}{6}$ from $\frac{5}{6}$ as we did with whole numbers. $\frac{5}{6} - \frac{2}{6} = \frac{3}{6}$. How is the numerator found? Why is the denominator 6? (It tells into how many equal parts one unit of distance was divided in each case). For decimal fractions divide the unit distance into 10 parts.

1250 . . . . .d) Subtraction developed from plane or solid regions

Ex. 1140

1260 . . . . e) Subtraction, the inverse of addition

Inverse - See 0270

Ex.

If $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$ then $\frac{3}{4} - \frac{1}{4} = \frac{2}{4}$ or $\frac{1}{2}$

If $\quad + \frac{1}{4} = \frac{5}{4}$ then $\frac{5}{4} - \frac{1}{4} =$

If $\quad$ + .31 = .56 then .56 - .37 =

1270 . . . . f) Role of zero in subtraction

Ex. $\frac{3}{4} - 0 = \frac{3}{4}$

$\frac{a}{b} - 0 = \frac{a}{b}$ Zero is the right hand identity element for subtraction.

.18 - 0 = .18

$\frac{2}{3} - \frac{2}{3} = 0$

.26 - .26 = 0 Any number subtracted from itself is zero

1280 . . . . g) Conclosure, noncommutativity, nonassociativity in subtraction

Closure - See 0140
Commutativity - See 0150
Associativity - See 0160

Ex. Nonclosure:

$\frac{1}{2} - \frac{3}{4} = \frac{1}{4}$

.5 - .75 = .25

$\frac{1}{4}$ and .25 are not members of the set of nonnegative rational numbers.

Noncommutativity:

$\frac{1}{2} - \frac{3}{4} \neq \frac{3}{4} - \frac{1}{2}$

since $\frac{1}{4} \neq \frac{1}{4}$

.25 - .13 $\neq$ .13 - .25

1280 (cont'd)

Nonassociativity:

$$\frac{1}{2} - \frac{1}{3} - \frac{1}{6} \neq \frac{1}{2} - \left(\frac{1}{3} - \frac{1}{6}\right)$$

since

$$\frac{1}{6} - \frac{1}{6} \neq \frac{1}{2} - \frac{1}{6}$$

$$0 \neq \frac{2}{6}$$

$$(.5 - .25) - .2 \neq .5 - (.25 - .2)$$

$$.25 - .2 \neq .5 - .05$$

$$.05 \neq .45$$

2) Computation

1290 . . . . a) Subtraction with common fraction notation, equal denominators (like fractions)

Level 26

Ex. $\frac{5}{6} - \frac{1}{6} = \frac{4}{6}$ or $\frac{2}{3}$

$$\begin{array}{r} \frac{5}{6} \\ -\ \frac{1}{6} \\ \hline \frac{4}{6} \text{ or } \frac{2}{3} \end{array}$$

$$\begin{array}{r} 3 \\ -\ \frac{1}{2} \\ \hline 2\frac{1}{2} \end{array} \qquad \begin{array}{r} 12\frac{3}{4} \\ -\ 6\frac{1}{4} \\ \hline 6\frac{2}{4} \text{ or } 6\frac{1}{2} \end{array}$$

1300 . . . . b) Subtraction with common fraction notation, unequal denominators (unlike fractions)

Ex. $\frac{5}{6} - \frac{1}{2} = \frac{5}{6} - \frac{3}{6} = \frac{2}{6}$ or $\frac{1}{3}$ or

$$\begin{array}{rcl} \frac{5}{6} & = & \frac{5}{6} \\ -\ \frac{1}{2} & = & \frac{3}{6} \\ \hline & & \frac{2}{6} \text{ or } \frac{1}{3} \end{array}$$

$$\begin{array}{r} 6\frac{1}{2} \\ -\ \frac{2}{3} \\ \hline 5\frac{5}{6} \end{array} \qquad \begin{array}{r} 120\frac{11}{12} \\ -17\frac{1}{3} \\ \hline 103\frac{7}{12} \end{array}$$

1310 . . . . c) Subtraction with decimal fraction notation

Ex.

$$\begin{array}{r} .75 \\ -\ \underline{.375} \\ .375 \end{array} \qquad \begin{array}{r} .584 \\ -\underline{.123} \\ .461 \end{array}$$

Do not use this code with subtraction involving money. Use 6040 and appropriate code under subtraction of whole numbers.

c. Multiplication

1) Properties

1320 . . . . a) Multiplication, a binary operation

Binary operation - See 0110

Ex. $\frac{2}{3} \times \frac{6}{7} =$

$.3 \times .4 =$

1330 . . . . b) Multiplication developed from addition of two or more equal fractions

Ex. $\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$ $\qquad .3 + .3 = .6$

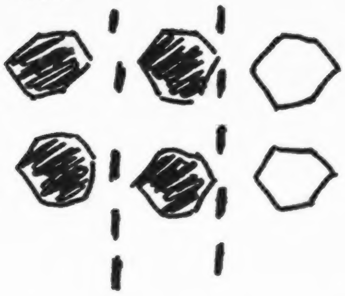
$2 \times \frac{1}{3} = \frac{2}{3}$ $\qquad .2 \times .3 = .6$

1340 . . . . c) Multiplication developed from arrays or sets

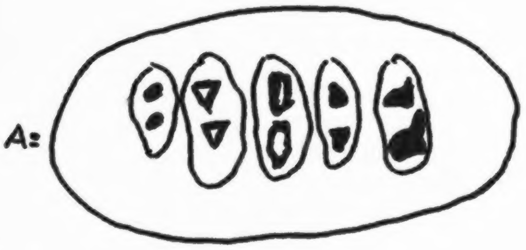
Arrays - See 0360

Level 13

Ex.



$\frac{2}{3} \times 6 = 4$



$\frac{3}{5} \times 10 = 6$

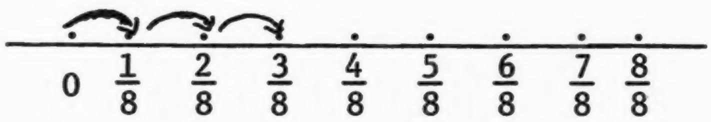
6 of the objects in set A are shaded

$\frac{3}{5}$ of the objects in set A are shaded

Note: One of the factors will be a whole number.

1345 . . . . d) Multiplication developed from the number line

Ex.



To find $3 \times \frac{1}{8}$ take 3 jumps of $\frac{1}{8}$ each on the number line $3 \times \frac{1}{8} = \frac{3}{8}$. Find $3 \times \frac{2}{8} = \frac{6}{8}$. How is the new numerator found? Find also $\frac{1}{2}$ of $\frac{5}{8}$. Where is the half way point from 0 to $\frac{5}{8}$? $\frac{5}{16}$? Then $\frac{1}{2} \times \frac{5}{8} = \frac{5}{16}$.

How is the new numerator found? the new denominator?

Topic II: Numeration and Notation

3000 . . . . . A. Difference between number and numeral

We shall consider number to be the property shared by a collection of matched sets, as 2 is the cardinal number of the sets $\{X,Y\}$ and $\{A,B\}$. We shall consider numerals as the names for numbers, 5, V, 100, etc. A number is an idea, abstract, and cannot be written or seen. A numeral is a symbol for the number, concrete, and can be written and seen.

Level 1,2 Ex. Draw a line from numeral 1 to each set whose number is one.

Level 3 Draw a ring around the correct numeral.

Level 4 Draw a ring around the correct numeral. Write the numeral.

B. Different numerals for the same number (renaming)

3010 . . . . 1. Expanded notation for whole numbers

Expanded notation is notation using numerals showing the place value of each digit.

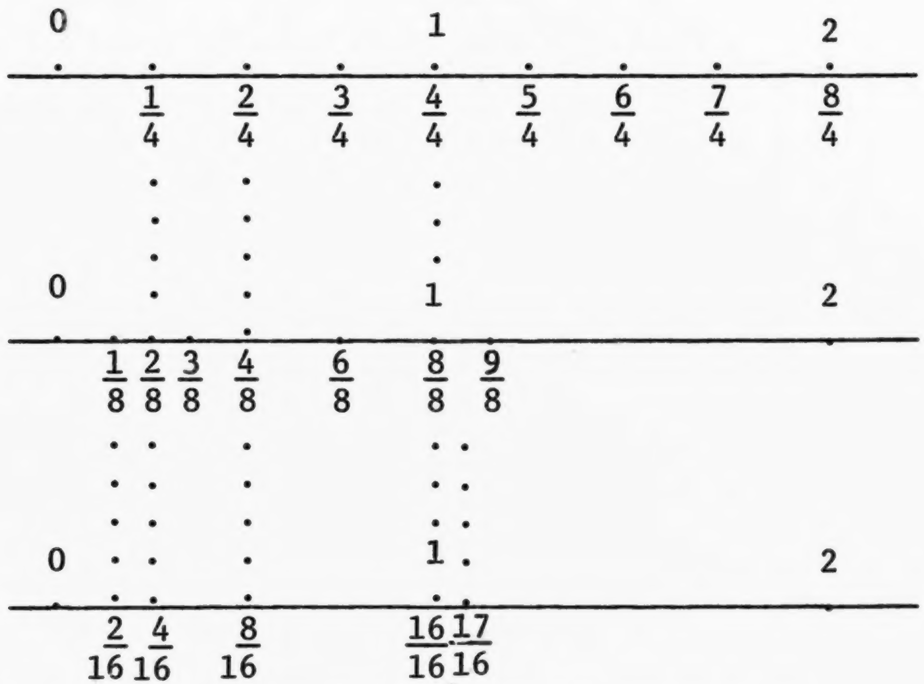
Level 8 Ex. 874 = 800 + 70 + 4 or 874

Level 10 874 = 8 hundreds + 7 tens + 4 ones

3015 . . . . 2. Expanded notation for nonnegative rationals (fractions)

3020 . . . . 3. Equivalent common fraction notation

Level 24,26 Ex.


0
1
2
$\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$ $\frac{4}{4}$ $\frac{5}{4}$ $\frac{6}{4}$ $\frac{7}{4}$ $\frac{8}{4}$
0
1
2
$\frac{1}{8}$ $\frac{2}{8}$ $\frac{3}{8}$ $\frac{4}{8}$ $\frac{6}{8}$ $\frac{8}{8}$ $\frac{9}{8}$
0
1
2
$\frac{2}{16}$ $\frac{4}{16}$ $\frac{8}{16}$ $\frac{16}{16}$ $\frac{17}{16}$

The fraction (numeral) $\frac{2}{4}$ may be renamed as $\frac{4}{8}, \frac{8}{16}$. $\frac{1}{2}$ may be renamed as $\frac{2}{4}, \frac{3}{6}, \frac{5}{10}, \frac{6}{12}$, etc.

3025 . . . . 4. Equivalent mixed numeral notation

Level 24,26

Ex. $1\frac{3}{4} = \frac{7}{4}, 4\frac{1}{3} = \frac{13}{3}, \frac{14}{3} = 4\frac{2}{3}$

3040 . . . . 5. Other names for a number

Level 4,5,
6,7,8,10,
12,16,18,
21,24,26

Use this code largely for other names for natural numbers, whole numbers, or integers. Use 3020, 3030, 3033, and 3035 for other names for rational numbers.

Use when not classified in 3010-3035.

If the purpose of the lesson is the development of basic facts, do not code 3040.

Ex. Some other names for 6 are:

Level 4,5,6,7,8,10,
12,16,18,21,
24,26

2 x 3　　　　12 ÷ 2
2 + 4　　　　1 + 1 + 4
7 - 1

3040 (cont'd)

Level 24 $\frac{1}{2}$ of 12

Level 21 Change form of 12 to 1 ten and 2 ones

C. Place value in base ten

3050 . . . . 1. Reading and/or writing words or numerals for the ten basic symbols (0-9)

Level 1,2,3,4,6, 9,15,21

Ex. See any Grade I textbook showing how numerals 0-9 are written. Reading numerals or words may occur in exercises such as: Make a mark on the set showing _5_ (five) members.

3070 . . . . 2. Units, tens (10-99)

Level 6,7,9,10, 15,16,21,23

Ex. 12 means 1 ten and 2 ones

Use code 3070 when place value is being emphasized.

3080 . . . . 3. Beyond tens

Level 9,10,12,18,19, 20,21,22,24,25

Ex. 103 means 1 hundred, no tens, and 3 ones

Use code 3080 when place value is being emphasized.

3100 . . . . 4. Rounding numbers

Level 17

Ex. 37 rounded to the nearest 10 is 40.
673 rounded to the nearest 100 is 700.
428 rounded to the nearest 100 is 400.

35 may be rounded to the nearest 10 as 30 or 40.
The text used will determine the policy.

D. Historical systems of notation (nonplace or place value)

Historical systems of numeration are considered to be those used before the Hindu-Arabic system; such as the system of Roman Numerals or Egyptian numerals.

Ex. XV in Roman numerals means 15 in Hindu-Arabic symbols.

Topic III: Sets: Physical and Abstract

A. Description of sets

Any collection of individual objects into a whole. A set only exists if it is well-defined; that is, one is able to tell whether an object is a distinct member of the set.

A set is usually indicated by braces {xx} or closed curves (xx) $\boxed{\text{xx.}}$

Level 1,3, 9,15 — Ex. Physical objects - a set of dishes
a set of dominoes

Abstract - the set of whole numbers

B. Set members or elements

Members - Each object in the set (collection) is a member or element of the set.

Level 3 — Ex. The set {□, ○, △, ▭} has 4 members or elements.

The square, circle, triangle, rectangle are elements of the set.

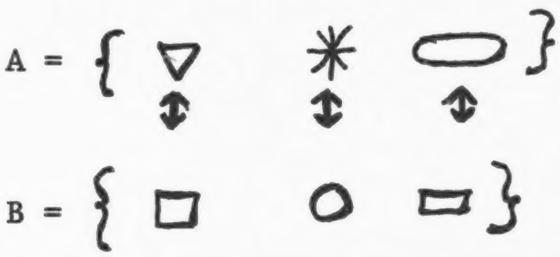
In the set {6, 7, 8, 9} each number is a member or an element of the set.

C. Kinds of sets

4010 . . . . 1. Equivalent (one-to-one correspondence)

Equivalent sets have the same number of members but not necessarily the identical members. Members of equivalent sets can be paired in one-to-one correspondence.

Level 1,2,3,9, 13,19 — Ex.



A and B are equivalent sets since each has 3 elements or since the elements can be shown in one-to-one correspondence.

4030 . . . . 2. Non-equivalent (general)

Non-equivalent sets do not have the same number of members and cannot be paired in one-to-one correspondence.

Level 1,2,3, 9,18

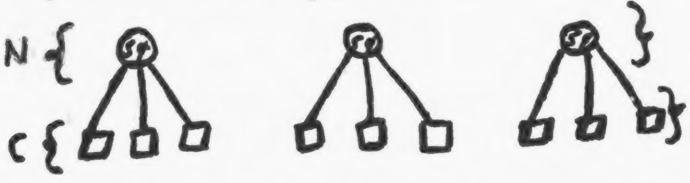
Ex. {□, ○} and {▽, ▯, ⬡}

are not equivalent sets.

4035 . . . . 3. Non-equivalent (one-to-many correspondence)

Level 14

Ex. If one nickel will buy 3 pieces of candy, then two nickels will buy 6 pieces of candy, etc.



In the drawing one element from the set of nickels is matched with three elements from the set of pieces of candy.

4060 . . . . 4. Subsets

If each member of a set B is a member of a set A, we say that B is a subset of A.

Level 3,9

Ex. A = {Set of all pupils
boys and girls,
in the room}

B = {Set of all boys
in the room}

B is a subset of A since all the boys belong to the set of all the pupils.

N = {2,4,6} . The subsets of N are {2};

{4} ; {6} ;

{2,4} ; {2,6} ; {4,6} ; { } ; {2,4,6} .

The symbol to indicate a subset is $\subset$. $B \subset A$ is read B is a subset of A.

Note: A subset may be removed from a set. See 0250.

4060 (cont'd) A set may be partitioned into equivalent subsets. See 0540.

4070 . . . . 5. The empty set

The empty set has no members or elements. The set of students with four legs is an empty set. The cardinal number of the empty set is zero. $\{ \}$ is one symbol for the empty set. The empty set is a subset of every set.

Level 4,10 Ex. Draw an X on each set whose number is zero.

Level 6 Count the sheep inside the pen. Write the numeral for the number shown.

4090 . . . . 6. Disjoint

Disjoint sets are sets which have no elements in common.

Ex. A = {○, □} B = {△, ▭}

A and B are disjoint sets.

$A \cap B = \{ \}$

C = 1,3,0 $D = \{7,4\}$

$C \cap D = \{ \}$ or $\emptyset$

4093 . . . . 7. Union of sets

The union of two sets, denoted by the symbol $\cup$, is the set of all elements belonging to either of the two sets or to both of them. Elements common to both sets are not repeated when naming the set union.

Level 1,2,4, 13,18 Ex. $A = \{1,3,5\}$ $B = \{2,3,5,7\}$

$A \cup B = \{1,2,3,5,7\}$

Level 1,2 Draw one more balloon so there will be as many balloons as girls.

Level 4,13 — Join the sets and write numbers for their numbers.

Level 18 — Tell how you would solve each problem below. Tell how you decided. Ex. Jean bought fish for 97¢ and a bag of popcorn for 5¢. How much did she pay for both?

Topic IV: Geometry

A. Intuitive concepts of geometric figures and ideas

5010 . . . . .1. Geometric figures in environment

Level 1,2,3, — Shapes such as circles, squares and triangles become familiar through pictures or objects seen in room, on trips,

Note: Use this code in introductory lessons to geometric figures where a variety of familiar shapes are used.

5020 . . . . .2. Geometric designs or patterns (sequences)

Level 5,8 — Ex. □-○-□—○— ?—?

Continue the pattern

5030 . . . . .3. Spatial relations without measurement (size, position)

Level 1,3 — Ex. Mark an x on the larger ball.
Mark an x on the largest ball.
Mark an x above (below) the doll.

5060 . . . . .4. Curves: simple, closed, open

A curve in a plane may be thought of as a set of points represented by a drawing made without lifting the pencil from the plane.

Level 3,12 — Ex.

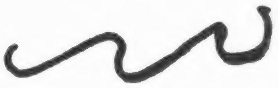


Figure A

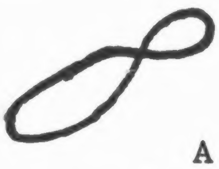


Figure B

Figure C

5060 (cont'd)

A simple curve does not pass through any point twice. Figure A (above) is a simple curve. Figure B (above) is not a simple curve.

A closed curve begins and ends at the same point.

Ex.

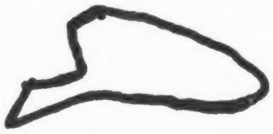
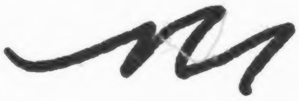


Figure D

An open curve does not end at the beginning point.

Ex.



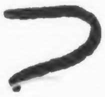


Figure E Figure F

A simple closed curve is undefined but may be thought of as beginning and ending at the same point so that in tracing the complete curve no other point is encountered twice. The continuous mark may consist of straight line segments as well as curved segments.

Ex.

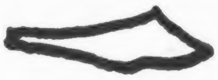


Figure G

Figure G is a simple closed curve. Figure B (above) is a closed curbe but not a simple closed curve.

Level 3 Draw a ring around the set of birds.

Level 12 Find a path out of the opened figure

5070 . . . . .5. Regions: interior, exterior

Level 5 A simple closed curve separates the plane into 3 sets of points.

5070 (cont'd)

All points outside the curve (exterior region)
All points inside the curve (interior region)
All points on the curve (boundary). The boundary has no points in common with either its interior or exterior regions.

Area is the measurement of the interior region and boundary of plane figures.

Note: Some elementary textbooks defined region as the union of a simple closed curve and its interior. Instead of interior region and exterior region as defined in the Content Authority List, the three sets of points are called: the curve, the interior, and the exterior.

See McGraw-Hill, Book 1, p.56,107
SMSG, Book 4, p.473.

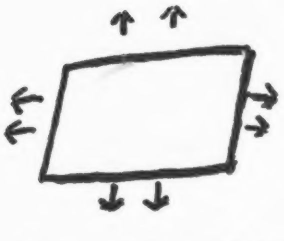
5080 . . . . .6. Representations of point, line, plane, space

A point is a concept which like a number exists only in the mind. As a numeral represents a number, a dot (.) represents a point. The tip of a pen or the sharp end of the lead in a pencil would suggest a point.

A line is a set of points extending infinitely in opposite directions.

Level 12,26

Ex. The marks where the walls meet the ceiling make you think of lines though they do not go on forever.



A flat surface suggests a plane. The set of points in a plane extends infinitely in all directions.

Ex. Some things in the room which you think of a plane are desk top, floor, a piece of paper. Perhaps the shadow is the best model since it is flat and has no thickness.

Space is the set of all points. We think of geometric figures like your book, or ball, or box of dominoes as space figures.

B. Concepts of geometric figures and ideas explored in depth

5090 . . . . 1. Point

A point is a location. It has no size. The intersection of two lines determines a point. Between any two points there is always another point.

5100 . . . . 2. Line

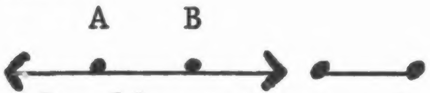
A line is a set of points which extend infinitely in opposite directions.

For any two points there is only one line which passes through both of them.

Two different lines intersect in only one point.

5101 . . . . 3. A line segment is an infinite set of points (a subset of a line) with two points indicating endpoints.

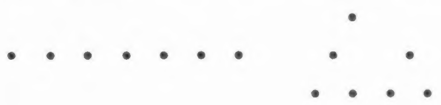
Level 5,12,14

Ex. 

is a picture (model) of a line segment. A wire stretched between two posts is a model of a line segment.

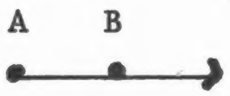
Level 5

Tell what the set of points make you think of



5103 . . . . 4. A ray is an infinite set of points (a subset of a line) with only one endpoint. A second point in the ray helps to read it.

$\overrightarrow{AB}$ is a picture of a ray.

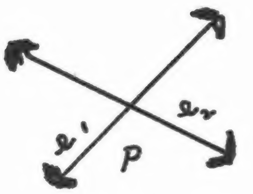
Ex. 

A beam of light coming from the sun is often called a light ray.

5105 . . . . 5. Related lines: intersecting, parallel

Lines drawn through a common point are called intersecting lines.

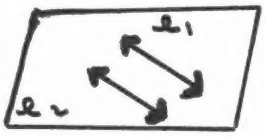
5105 (cont'd)



e1 and e2 are intersecting lines through point P. How many lines can intersect at point P? (infinite number).

Parallel lines are lines lying in the same plane and having no point in common or all points in common.

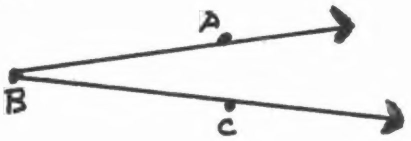
Ex. Two rails of a railroad track represent parallel lines.



5115 . . . . 6. Angles

An angle is the union of two rays with the same endpoint.

Ex.

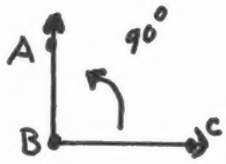


5125 . . . . 7. Kinds of angles

A right angle is an angle whose measure is 90°.

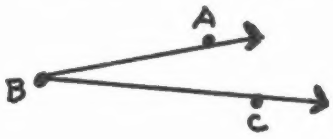
Level 12,20,26

Ex.



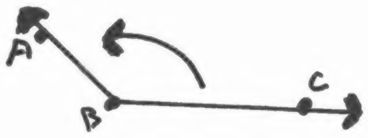
An acute angle is an angle whose measure is greater than 0° and less than 90°.

Ex.



An obtuse angle is one whose measure is greater than 90° and less than 180°.

Ex.



Level 12

Make a square corner by folding paper once to make a line segment and fold again on the line segment.

5150 . . . . a. Triangles

See 5280 and 5290 for perimeter and area.

A triangle is a polygon of three sides.

Level 2,3,5,8,
12,20,26

An equilateral triangle is one whose three sides are equal in length (or measure).

An isosceles triangle is a triangle with at least two sides or two angles equal in measure.

A scalene triangle is a triangle with no two sides equal in measure.

A triangle having one angle whose measure is 90° is a right angle.

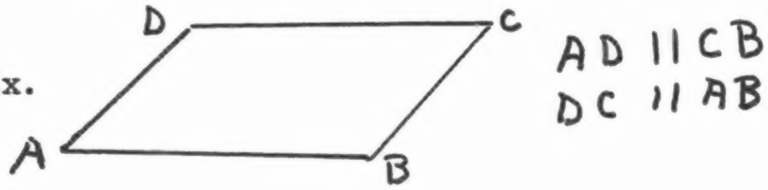
5160 . . . . b. Quadrilaterals

Quadrilaterals are polygons having four sides.

A parallelogram is a quadrilateral with both pairs of opposite sides parallel.

Level 1,2,3,5,8,
12,20,26

Ex.

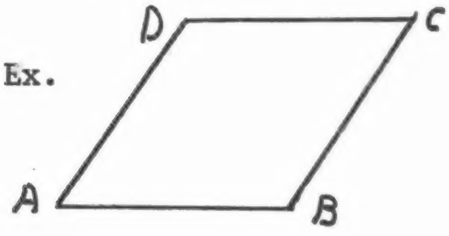


A rectangle is a parallelogram with one right angle (and therefore with four right angles).

A square is a rectangle with two adjacent sides equal in measure (and therefore with all four sides equal).

A rhombus is a parallelogram with two adjacent sides equal in measure (and therefore with all four sides equal).

Ex.



5160 (cont'd)

A trapezoid is a quadrilateral with one and only one pair of parallel sides.

Ex.

Level 3	Recognize square.
Level 5	Record the inch measure for each side of a rectangle or square.
Level 8	Tell how many rectangles or squares you can find.
Level 12	Use a square corner to test a rectangle.
Level 26	Drawings on graph paper are compared to distinguish rectangles from other quadralaterals.

5172 . . . . 8. Curves

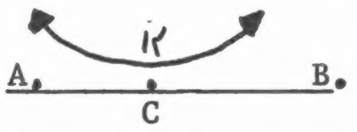
5174 . . . . a. Simple, closed, open

See 5060

5176 . . . . b. Convex, concave

A curve is said to be convex toward a point or line if it curves toward the point or line

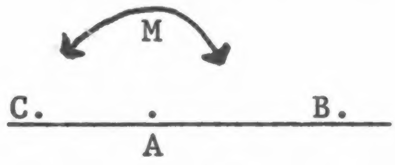
Ex.



Curve K is convex toward $\overleftrightarrow{AB}$ and point C.

A curve is said to be concave toward a point or a line if it is hollow toward the point or line.

Ex.



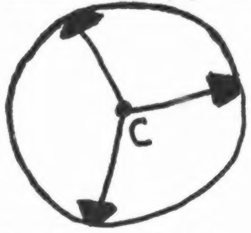
The curve is concave toward $\overleftrightarrow{CB}$ and point A.

5180 . . . . 9. Circles

A circle is the set of all points in a plane which are the same distance from a given point (the center) of the circle.

Level 1,3,5,8
12,20,26

Ex.



All the points on the curve are equidistant from the center C.

The radius, diameter and a chord of a circle have special characteristics.

A circle separates the plane into interior and exterior regions.

Central angles cut off arcs and sectors of the circle.

See codes 5280 and 5290 for coding circumference and area of circles.

Level 5

Tell which set of dots makes you think of a circle--measure the lines to the center.

5255 . . . . a. Similarity: scale drawing

In a scale drawing all distances are in the same ratio to the corresponding distances on the original figure.

. . . . 10. Measurement of geometric quantities

5260 . . . . a. Line segments with ruler and/or compass or other measuring device.

Level 1,5,14,17,
23,26

5270 . . . . b. Angles with protractor and/or compass or other measuring device.

c. Perimeter or circumference of simple closed curves.

Topic V: Measurement of Nongeometric Quantities

6000 . . . . A. Meaning of measurement (direct, indirect)

To measure means to compare an object with some suitable unit usually a standard unit.

Level 23

Ex. Length is measured by a unit of length such as an inch or yard. Area is measured by a square unit such as a square foot.

6001 . . . . 1. Approximate nature of measurement

Level 23

No measurement is exact. If you are measuring a line segment your measurement will be affected by the width of the dots at the endpoints, the angle at which you see the lines on your ruler, worn edges of your ruler and so on.

6030 . . . . a. English units for yards or less

Level 5

Ex. Use foot ruler to measure length of pencil by inches.

Level 14,17,20

Use yardstick to measure length of room by yards and inches.

Level 23,24,25,26

Use yardstick to measure length and width, of top of desk converting inches to feet, feet to yards.

6034 . . . . b. Square units of measure in the English system of measures.

Level 25

Ex. Mr. Anderson paid $2,415 for 7 acres of land. What was the cost of each acre of land?

6040 . . . . B. Money

Level 1,2,5,8

Ex. How many banks do you see? How many pennies do you see? Is there a penny for each bank? Draw another penny so there there will be as many pennies as banks.

Match each price tag with the correct amount of money. e.g. 1 penny, 1 nickel = 6¢.

6040 (cont'd)

Level 14,15,16,17	Scott saves 5 cents each day. How many cents will he save in 7 days? 7 x 5 = Penny = 1 cent Dime = 10 cents Nickel = 5 cents Quarter = 3 quarters + 3 pennies = 78 cents Will 1 dime buy as much as 10 pennies?
Level 19,20	Ray had $6.75 in his savings bank. He put in 75 cents. How much money had he in his bank then? 675 + 75 = $7.50.
Level 21,22,23,24, 25,26	Nora had $.41. She spent some during the day and had $.06 left. How much money did she spend? Note: The signs $, ¢ are not to be used in equations. They are included only in the final answer to a problem. Roy paid $.40 for 5 grapefruits. How much did each grapefruit cost? The school ordered spelling books for the fourth grade. If each book cost $1.18, how much would 29 spelling books cost?

6050 . . . . C. Time

Level 8	Write the numeral for the time shown on each clockface.
Level 14	Each arrow represents the minute hand of a clock. Write the numeral for the number of minutes shown.
Level 17,19	The short hand on a clock is called the hour hand. It measures time in hours. The long hand is called the minute hand. Find the 2 hands.

3

6050 (cont'd)
Level 23,25,26

6060 . . . . D. Distance in English units for lengths longer than a yard.

Level 20,23,24,
25,26

6070 . . . . E. Liquids in English units

Level 5,14,17,20,
23,24,25,26

6080 . . . . F. Temperature: Fahrenheit and Centigrade

Level 17,23,25

6090 . . . . G. Weight in English units

Level 17,20,23,
24,25,26

6100 . . . . H. Dry measures

Level 23,25,26

6110 . . . . I. Quantity (dozen, gross, etc.)

Level 17,20,25,26

6130 . . . . J. Conversion to other standard units measuring several kinds of nongeometric quantities

Level 23,26

Ex. In one lesson:

10 pecks = 2 bushes 2 pecks

90 minutes = 1 hour 30 minutes

15 quarts = 3 gallons 3 quarts

etc.

Note: If conversion is being developed with one kind of nongeometric quantity only, code under the quantity.

6130 (cont'd) Ex. 21 days = 3 weeks

120 minutes = 2 hours

24 months = 2 years

3 days = 72 hours

etc.

Topic VI: Number Patterns and Relationships

7055 . . . . 1. Multiples

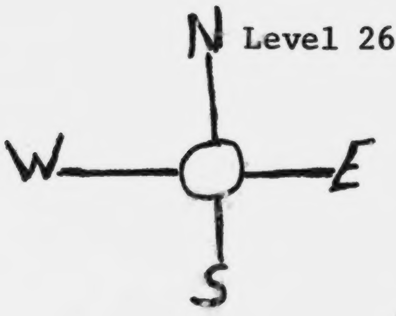
Level 20,22

Multiples of a number N are numbers (product obtained by multiplying Nby integers.

Ex. 10, 35, 125, and 5000 are multiples of 5.

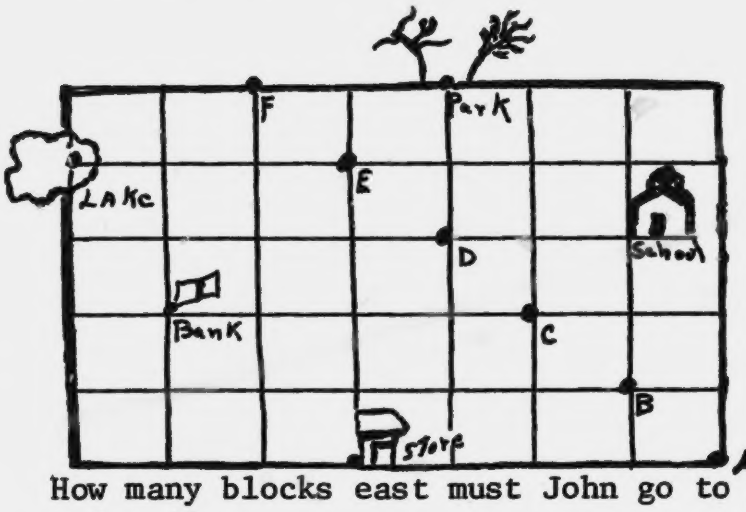
7140 . . . . 2. Grid

Level 26



A grid is an arrangement of regularly spaced parallel lines.

Ex.



How many blocks east must John go to get to point A?

How many blocks east and how many blocks north does he go to point C?

Note: Magic squares and practice exercises for basic facts in a grid arrangement are coded under the operation involved. The behavior code will indicate whether the practice uses magic squares or similar grid ideas.

7160 . . . . A. Special patterns (including short cuts)

Level 8,14,21,
23,24,25

Code with an operation if possible.

7160 (cont'd)

Ex. To multiply by 25 quickly, multiply by 100 and divide by 4 (actually multiplying by $\frac{100}{4}$, another name for (25).

Ex. $45^2 = (40+5) \times (40+5)$

$= (40\text{x}40) + (10\text{x}40) + (5\text{x}5)$

$= (50\text{x}40) + 25 = 2025$

Using the short cut

$45^2 = (5\text{x}4) \times 100 + 25$ or 2025

Code 7160 and 0700 (raising to powers and finding roots).

Ex. 15 x 15 = 225
35 x 35 = 1225
65 x 65 = 4225
75 x 75 = 5625
95 x 95 = 9025
45 x 45 = 2?25
85 x 85 = ????

There is an easy way to find the product when a number is multiplied by itself if the numeral for the number has a 5 in the ones place. Can you see the pattern?

Let t = tens digit
Let 5 = ones digit

$(t + 1) \times t \times 100 + (5 \times 5) = N$

Ex. Since 3 + 7 = 10, then 13 + 7 = ?
Since 8 + 7 = 15, then 18 + 7 = ?
Since 8 + 9 = 17, then 18 + 9 = ?
Since 9 + 6 = 15, then 19 + 6 = ?
Since 4 + 9 = 13, then 14 + 9 = ?

Topic VII: Other Topics

8002 . . . . A. Rate pairs

Level 20

A rate is a comparison between two quantities having different dimensions such as miles per hour.

Ex. If one candy bar costs 6¢, 2 candy bars cost ?¢.

8002 (cont'd) Note: Most verbal problems using multiplication involve the concept of rate.

See 4035.

8050 . . . . 1. Frequency tables, charts, graphs (bar, line, circle, dot, picture, etc.)

Level 4,26

8060 . . . . 2. Measures of central tendency: average

Level 25,26

The average is found by dividing the sum of the numbers by the number of items in the sequence.

Ex. The average of 4,8,10 and 16 is (4+8+10+16)÷4.

8150 . . . . B. Estimation

Level 18,19,23,25

An approximate (estimated) answer to a problem can often be found by using round numbers and mental computation.

Ex. The sum of 428 is approximately
365 400+400+200 = 1000
+215
1008 actual sum

8170 . . . . C. Mathematical sentences (equations)

Level 4,5,7,
14,21

An arrangement of symbols indicating that a relation exists between two or more things. The sentence contains at least two symbols for numbers, points, sets, or the like and a relation symbol. The most common relation symbols are $=$, $>$ and $<$.

Ex.

	symbol for thing	relation symbol	symbol for thing
Equations:	$2 + x$	$=$	3
	$3y$	$=$	18
Inequalities	2	$>$	1
	$\frac{x}{y}$	$<$	7
	$3 + 5$	$\neq$	10

8170 (cont'd)

Kinds of Sentences	Open Sentence	Statement
	$x + y = 13$	$2 + 11 = 13$
	$4 \square 9 = 36$	$4 \times 9 = 36$
	$6 \times 5 \bigcirc 24$	$6 \times 5 > 24$

Developmental work with problem-solving may be classified under code 8170. Problem-solving (application) should be coded under the operation involved.

APPENDIX C

THE URBAN SCHOOL WORKSHOP AGENDA

WORKSHOP

AN EDUCATIONAL PROGRAM FOR CHILDREN OF THE URBAN SCHOOL

Dates: August 4, 5, and 6, 1969
Location: The Urban School

August 4, 1969

9:00 - 9:15 Introductions and explanations of Workshop Goals

9:15 - 10:30 Review of Preschool and Primary Education Program

Panel: Dr. Castaldi, Mrs. Hays, Mrs. Wilson, Mr. Lindley

a. Description of program
b. Contribution of program to children's growth
c. Shortfalls in our progress
d. Evaluation of progress

10:30 - 11:30 Description of special curriculum needs of Urban School children. Dr. Castaldi (testing program, checklists, logs, psychological reports, observations, etc. will be used to provide descriptive material).

11:30 - 1:00 Lunch at a local restaurant with a central office administrator and/or a school board member as a brief speaker to express their support for the teaching staff's efforts to provide the most appropriate educational program for Urban School children.

1:00 - 1:30 Walk through the Park.

1:30 - 2:00 Time for recording reactions to the conditions of the community and for answering a questionnaire about the affect of community conditions on the learners self-concept.

2:00 - 3:00 Discussion of the questionnaire and observations - Dr. Alfred Castaldi.

August 5, 1969

9:00 - 10:30 and 10:45 - 12:30	Dr. G. Bradley Seager Individualized Instruction a. Curriculum b. Teaching Methodology
12:30 - 1:00	Lunch Break
1:00 - 3:00	Team Teaching (role playing) Dr. G. Bradley Seager

August 6, 1969

9:00 - 10:30	Sensitivity Training Session (Simulation Game) Dr. G. Bradley Seager
12:00 - 1:00	Lunch Break
1:00 - 3:00	Group divided into two groups - one with Dr. Castaldi and one with Dr. Seager Teacher's Objective - Development of Self-Awareness in working with children from poor families

APPENDIX D

RURAL SCHOOL
TEACHER EVALUATIONS

March 5, 1969

Dear Mr. Kershner:

Listed below are the significant benefits of The Ford Foundation program as I have seen it in the two years that I have been associated with the project.

The children were given pre-school experiences that they would not have received otherwise.

Children from economically deprived homes live in poor environments as far as educational experiences are concerned.

We find that the education of the parents is very limited (6th or 7th grade education) or they have been special education students.

When these children enter the regular classroom they do not receive any special attention from the teacher.

When these children entered The Ford Foundation program they were the center of attention.

The teachers in The Ford Foundation were given special training in working with the economically deprived children and therefore developed a great concern for them.

Due to the special training of the teachers their attitudes changed toward the children and parents of the deprived.

The attitude of the parents toward the school changed and a better relationship was established between the two.

The parents of the deprived joined the P.T.A. and some even became officers in the organization.

Some of the parents become volunteer aides in the classrooms and spend one day a week there.

The teachers learned to use a larger variety of material in the classroom.

The teachers learned to plan their day of instruction to a greater degree which resulted in better instruction.

The teachers also learned to work as a team and to exchange ideas and material.

The teacher gained more knowledge about each pupil and was able to evaluate each pupil better.

The teacher learned more about individualized instruction and a non-graded program.

More teacher-made materials were developed.

The children were encouraged to do more thinking and creative work.

The children learned to work together on common problems and to be concerned for each others' welfare.

The children were placed at an instructional level at which they were able to succeed.

The children were encouraged to express themselves verbally and do so very well.

Yours truly,

Mr. Carmen A. Guappone
Principal
Albert Gallatin Area
School District
Central Elementary School

March 5, 1969

Dear Mr. Kershner:

I was happy and surprised to receive your request of a Ford Foundation Project teacher's random thoughts about the program and will herewith try to put these thoughts in writing - randomly, as you had suggested.

The word "random" has already been used three times in this letter and possibly (very) this is the over-all feeling I've had so far this year - nothing was too structured at the beginning of the year and, therefore, most of my decisions were random ones as to how to approach my non-graded class room. From these random approachs, one basic conclusion has been reached and that is: that no generalities that are too restrictive should be reached, for each class (even within the project), each project, and each child need a very flexible approach to succeed. I find I must work within the structure that this otherwise graded elementary school has already set up and from there I improvise constantly. It appears to me that for a project to succeed it must allow its teachers and principal to make most of their own rules - even if these have to be reworked each fall for any improvements. The freedom for self-expression and creativity that the teacher has is felt by the students and they, I feel, sense that they are individuals then, also.

So as to not ramble on, much more and get to other points I shall say that:

1. The children are, I feel sure, benefiting from this program which is, of course, the most satisfying aspect of it.

2. The teachers are not without excellent guidance from the principal who is extremely interested, and from the advisors who visit for conferences and in-service training.

3. The underprivileged child does not fail when in a non-graded class and is always progressing, which is a salient attribute of this program.

4. The problems of grouping and of the accompanying team teaching will always (I guess I shouldn't say this) be with a program like this.

These problems, however, are good for they make one aware of how much reorganizing and new approaches must be found, therefore, constantly keeping the teacher and the program in a state of flux--never a static thing. This constant search for new ways to approach our problems keeps and will keep it alive and we will, thusly, be able to sustain the searching minds in our pupils that we so much want to see.

It has been a good year!

Sincerely,

Linda G. Helmstadter
Central Elementary School

March 5, 1969

Dear Mr. Kershner,

In regard to the Pre-school and Primary Education Project conducted by the Department of Public Instruction, Department of Public Welfare, Department of Health and our local School District, and sponsored by The Ford Foundation which is coming to an end in June of this year, I would say sincerely that since I have been with the project from June 1964 to June 1969, total of five years it was a wonderful educational experience.

Each year having a new focus and new learning experience both for the children and the teacher. I have enjoyed very much working with both the nursery and kindergarten age child. By attending many in-service workshops throughout the five years, I have come to know many outstanding professional people. I have accumulated a wealth of material on the very young child who is culturally deprived. Also I have been able to work with the child's parents both at home and at school. This gives one a great knowledge about the child as he performs in school.

During one year of the project I was assigned as social worker. This gave me a chance to know many children and parents. Another year of the project, the social worker and I worked together as a team. We encouraged parents to come and visit and help out in the classroom and also to attend evening meetings.

I would say this last year of the project being involved in a team teaching program has been very interesting in that you can try new ideas; work with different groups of children, sharing films, sharing children; having teacher aides and parents in the classroom, also having two wonderful consultants visiting often and giving us ideas to try.

Yours truly,

Ellen McGill
Project Teacher
Non-graded Primary

March 5, 1969

Dear Mr. Kershner:

Before expressing any of my views or experiences with the Ford Project I wish to remind you that this year is my first with the project.

It seems to me that the children are happier, more enthusiastic and certainly they verbalize more than they otherwise would if it were not for the project. I think this is especially important with children of this type. The fact that the children can progress at their own rate, thus eliminating feelings of failure, is important. The movement of the children from one teacher to another exposes them to the different teacher personalities. This movement enables the teachers to become acquainted with, discuss, and diagnose problems of the individual child. There are, of course, other advantages besides those mentioned.

Perhaps I should also comment on the in-service training I have received by being a member of the team. This has been of great value and an incentive to me. In view of the fact that my previous experience was in a self-contained classroom I might say it was even a necessity. I have been and continue to be thankful for our consultants expert guidance.

There is no doubt in my mind that this project has been of great benefit to these children.

Sincerely,

Mrs. Dorothy Galanko

March 5, 1969

Dear Mr. Kershner:

The Ford Foundation Program has served to help meet the needs of those children who might have been cast aside with no one taking any particular interest in them.

Many of the children are at a disadvantage because of their low socio-economic level. This, coupled with a low I.Q. and lack of motivation, makes teaching a real challenge.

Because of the small classroom sizes The Ford Foundation children have benefitted from individual attention, not only academically but in the social area as well. Even those with the most bizarre behavior originally are now accepted by their peers and work cooperatively with the teaching team on most occasions.

Many of the parents have become more conscious of their children's health needs as a result of the initial interest shown in this area when the program first began. The social worker held informal meetings and distributed literature pertinent to the health needs of children. These informal gatherings probably created for the first time an awareness in some parents as to the real needs of their children, both physically and mentally.

The Ford Foundation children enjoy school and all it stands for. They find it easy to verbalize and are anxious to express their feelings.

The testing program has assisted the teachers in their planning. The weaknesses and strengths of each student can easily be assessed by our cumulative records. Because of frequent testing and exposure to unfamiliar personnel, the children are not hesitant or fearful of adults.

Creating a feeling of worth within for some of these children has made it easier for them to adjust to a school situation. It is hopeful that the desire to learn will be instilled at this primary level and will be a carryover for the remaining school years.

Mrs. Hazel Slabaugh

APPENDIX E

URBAN SCHOOL

TEACHER EVALUATIONS

Dear Mr. Kershner:

The manner in which an administrator looks at a school is in most cases much different than an educator will look at the same school, if he is concerned only with the learning process itself. The administrator must be concerned with all phases of the total school program - the physical plant, the heating system, the availability of special services rooms, the cafeteria, the all-purpose room, the ancillary services that are available, the teaching staff, the parents of the children, the parent organizations, the superintendent's effect on the school program, the relationship of the school itself with the district as a whole, and of course, the child and the learning process.

The Lacey Park School and the programs developed within the school under the influence of The Ford Foundation, the Department of Education, the Department of Public Welfare, the Centennial School District, and the personnel associated with each group, has undoubtedly a program that in the vision of the principal is much different from a traditional school program.

The curriculum with its language period, math period, and selection period dictating the mode of the kind of education the children receive is one which is difficult to find in a traditional situation. The children are not forced into achieving a certain level of performance in order to go into the next year. The nongraded aspect permits more freedom and possibilities for individualization. The children are encouraged to learn but they are encouraged in a positive manner with less pressures. The competency of the teacher to diagnose learning levels is of much importance in such a set-up.

The value of the teacher's aides cannot be denied. They are extremely supportive of the teachers and allow much more individual attention to be focused on each child.

Team teaching as it is practiced in our school facilitates the sharing of information about all of the children, making individualized teaching more of a possibility. The need to develop a positive image, I'm certain, are effected considerably by the teaching staff's familiarity of a large number of children in the school. The fact that the school is a small school and that the teachers have been a stable group also rank high in our ability to help develop within each child a rewarding image.

The pre-school program, alone, is a tremendous influence upon the school. The effect that a program of this kind has on the school is both immediate and far reaching. The facilities and equipment that must be provided for these children is far different than the facilities and equipment that is utilized by young primary children.

The activities, quite naturally, that these children engage in, are so different from that of the primary children. The equipment used by pre-school children and the activities that they participate in, cause a much different outlook in a school. The success of such a program cannot be denied when you see the children make the next step into the kindergarten. They are so much more ready for that step than they would be without the experience. Their knowledge of the building and their awareness that it is going to be a happy experience for them is a factor that makes a pre-school program such a success.

The involvement of the parents along with the large number of volunteers that work with us is probably the greatest visible difference in our school. The elementary principal, in many cases, will look upon this kind of a program as one of detriment with a feeling that parents do not belong in the school. I feel that the importance of an active volunteer program and open house atmosphere for parents cannot be negated. To make the parents feel welcome in the school, to make them feel that they are important to us in the education of their children is of much value to the school as they work with children.

The Lacey Park program, as a whole, is to me, a program really developed around the needs of the children and not upon some arbitrary criteria which we want to force upon the children. It is a program which should be expanded to include all the children which might benefit because of the circumstances under which they live.

Arnold E. Lindley,
Principal

August 15, 1969

Dear Mr. Kershner:

In reviewing my years in The Ford Foundation Program, I cannot help but think what it has first done for me as a Professional Educator. I say Educator, because that is now how I can think of myself. I started as an experienced teacher, well versed in the theory and practices of Early Childhood Education and quite sure of my abilities with children. Though I felt quite open-minded, there were certain principles I held sacred. Other philosophies of education were approached with a degree of resistance and those advocating radical change were suspect.

I doubted if disadvantaged children of normal intelligence really had different educational needs. It seemed to me a good sympathetic teacher using the prevailing philosophy would accomplish the necessary goals.

Our theory had been that young children must identify with a single adult figure, and bringing adults,especially untrained ones into a classroom would cause confusion and insecurity for the children. Working with parents was important, but bringing them into the classroom on a regular basis was indeed folly.

Through The Ford Program, during inservice meetings, meetings with top-notch, well-versed consultants, I learned to realize an educator must not only be knowledgeable but must be willing to evaluate new ideas on the basis of "will they work." I not only listened but began to read all I could find that was published in this field.

Stimulated to innovation and creativity I began to grow in all phases of my profession. To my surprise the adults in the classroom became a very real necessity. Parents in the classroom understood what we were trying to do and also became a vital part of my work.

Disadvantaged children do have very special educational needs. It was necessary for me to develop techniques of diagnostic teaching and involve activities to satisfy individual needs.

It also became apparent my responsibility did not stop in my classroom, but a close team work approach on philosophy and techniques, with the entire staff was vital to the education of these children.

One new focus of my responsibility involved in connection with home visits. When visiting homes and viewing garbage-laden streets, the need for arousing community action became apparent.

Today I do not hesitate to write letters to the newspaper, speak to political agencies and arouse personal friends to obtain outside support in an attempt to correct prevailing ills. Though not largely successful, these attempts have helped bring community volunteers into our school. What then, has been done for these children through The Ford Program? First, the needs of these children have been brought to the attention of the entire school district. The community at Lacey Park for the first time is aware that somebody cares. The school program has brought social workers, health agency, and school personnel into the homes.

The parents for the first time have been encouraged and welcomed into the school. It is evident that the feeling of the community toward the school is a positive one. Through parent-meetings the community itself has been shown ways to organize for some degree of self help.

Educationally our children have had the advantage of a dedicated staff, using all means available to improve educational techniques and convince administration within the school district of the need for a follow through program.

It is true this is just a beginning, yet after our last in-service program we see hopeful signs that the entire school community is aware that something exciting is happening at Lacey Park, and many teachers have noticed their willingness to try new techniques in their schools. By sharing what we have learned we see distinct hope for a break through, throughout our entire school district.

Mrs. Beverly Schwartz

March 10, 1969

Comments concerning The Ford Foundation Program
for teaching the culturally deprived.

Dear Mr. Kershner:

It is my earnest belief that this type of flexible, varied program could mean the difference between saving or losing these children educationally speaking. I feel that the children make as much or more progress -- certainly that progress is more meaningful — than in a previous conventional type classroom set-up. They seem to acquire an understanding of "why reading?" and therefore read with more expression. They also seem to possess more interest in finding out through reading.

The freedom of movement about the classroom and from room to room throughout the day makes it possible for the children to give more concentrated attention during those short periods when it is required.

The interaction encouraged by this program is a tremendous aid in the social development of the children.

Release from the pressures of getting the children to a certain point by a certain time enables the teacher more time to plan meaningful activities which the children do not view as "hard work" but rather "fun activities."

Such a relaxed atmosphere can only mean more pleasure and less pain for all concerned. However, if we are to anticipate any degree of success in the future with this type of program it will have to be afforded more stability in the way of directorship than we have heretofore been accorded. The constant turnover in the position of leadership has given rise to frustration and insecurity among the teachers. Here lies my chief criticism and one that I believe to be well founded.

Doris C. Hays

February 28, 1969

Dear Mr. Kershner:

On the plus side--

1. Yes, pre-school experience is good for the disadvantaged child. It widens his horizons and makes formal schooling easier.
2. The parents profit from an informal introduction to the school situation. A good pre-school teacher softens the image of the threatening "school marm."
3. Teachers gain insight into the needs of the disadvantaged child, his problems, his parent's problems.

I'm all for it, but!

On the minus side--

1. There was too much change in personnel from the top down.
2. There was too much change in techniques and philosophies.
3. There was too little use of experienced knowledgeable people with practical experience and too much reliance on ivory tower theory.

May I suggest if you plan to introduce pre-school education elsewhere that:

1. You spend the first three to six months with our children so that your directors and teachers can develop a curriculum and philosophy, and set up goals before the class goes into operation.
2. Work towards a long-term contract with employees so that these already disorganized children don't have to make constant readjustments to new authority figures.

Sincerely,

Anne Cramer

August 15, 1969

Dear Mr. Kershner:

1. For me The Ford Project has afforded me the opportunity to change my mode of teaching, which is more suited to the needs of my children. I no longer have to teach in a way that is uninteresting or of no educational value to my children.

2. It has brought to us over the two years that I have been involved, people of great assistance to share their knowledge. These people have been most helpful and understanding. I think we have all learned a great deal from each other and from the children.

3. The testing processes have been changed, which are better suited to our children. I think we will be better able to see just what has been accomplished with our children.

4. Most useful and gratifying to me was the workshop that it provided us. It brought in other teachers from other schools who will have our children this coming year. These teachers just through their attendance, and willingness to change, will be more able to cope with the learning problems our children pose and the understanding they must have to succeed. I think our children will now have a better chance at meeting success and learning how to cope with failure when they do meet it.

For the children:

1. It has given the children the benefit of Pre-school, Nursery, and Kindergarten. It has in a way taken over the job of the home, which our children were not getting. They are more able now to meet school situations than they were before this all happened.

2. It has opened the door to better parent relations. This has helped the younger children who are not yet of school age, so that they will be better prepared when they do come to school. It has helped the parents better understand what the school is trying to do for their children. It has changed the attitude of the parents because to most of them their schooling did nothing for them and had been a bad experience of failure.

3. It has given the parents and the children a better self-image.

4. The children have been given more chances for success and taught better ways of meeting failure and correcting it than just giving up.

5. It has made the children more interested in school than ever before. We see this in fewer absentees and we are hopeful that if this record is continued, we will see fewer drop-outs in the future.

6. With the non-graded system, children who would otherwise have failed, continue on wherever they are and are not met with the problems at home, in the neighborhood and in the school of being retained.

7. Again I must mention, because to me it is most important both to me and the children, the fact that the other teachers were brought in and shown the necessary ways to deal with and understand and love our children. If this is done teaching becomes a JOY, not a JOB and the children benefit most.

May I say thank you again for letting me be a part of this project.

Mrs. Mary Hudders

APPENDIX F

URBAN SCHOOL

WORKSHOP REPORT

Report to: Dr. McDonald, Superintendent
Mr. Vaughan, Director of Pupil Services
Mr. Walker, Elementary Supervisor

From: Kullie Mellor, Preschool and Primary Education Project Administrator

Re: Final workshop of the Preschool and Primary Education Project

Under the guidance of Dr. Castaldi and Dr. Seager and provided by financial support of The Ford Foundation under the auspices of the Bureau of Research, Department of Education, the final workshop of the Preschool and Primary Education Project was held at Lacey Park School August 4, 5, and 6, 1969.

The purposes of the workshop were:

(1) to review achievements of the Preschool and Primary Education Project and to project the significance of the findings for future years;
(2) to inform the administration and staff who have elementary school-aged children from Lacey Park outside of the Park about the characteristics and special educational needs of Lacey Park children;
(3) to provide opportunity for Centennial staff to understand themselves better in relation to Lacey Park children.

Heretofore, the project staff had not concerned itself directly with the educational program of Lacey Park children beyond the Lacey Park School. At this time, however, besides all of the Lacey Park School staff, teachers of Lacey Park children came representing Longstreth, Shelmire and McDonald, or other schools serving elementary school-aged children from Lacey Park. Johnsville School was not represented. Mr. Dekutoski, 6th grade principal, represented his teachers of Lacey Park children.

Prior to the workshop, it had seemed to me and to others that there was a definite lack of communication between Lacey Park teachers and the teachers of the so-called "feeder" schools. Lacey Park teachers had often expressed fears about the educational future of their students if the students were expected to perform on an equal basis with children from middle-class neighborhoods. At the same time, teachers of the "feeder" schools had not benefited from the consultation that had been provided by The Ford Foundation to Lacey Park staff during the past six years. As the culminating point of the project, the workshop was planned to share understanding of the special needs of Lacey Park children and to promote a new awareness of ourselves as we accept the challenge of educating these young people.

There is some risk in planning a workshop which brings strangers face-to-face with the expectation that they will be candid and willing to examine their attitudes toward the poor. My fears were unnecessary. Everyone who participated made a frank and diligent effort to explore the issues and their own feelings about the poor.

To get the full flavor of the environment from which the Lacey Park child comes each day, teachers were paired in teams of two and were asked to spend Monday morning on foot exploring the slum neighborhood. An appointment had been made for each teacher to visit at least one child in his next year's class. This afforded each team of teachers the opportunity to visit at least two homes that morning. Some of the staff visited in the Community Center. Dr. Castaldi and Mrs. Corson (Longstreth) even called on the owner of the Park, Dr. Gabriel Elias, a prominent element in the lives of any resident in this slum area.

The morning's assignment stimulated the workshop participants to a new level of awareness of the crippling effects that the physical environment must have on the families who reside in the Park. There was a determination on the part of the workshop enrollees to act as private citizens to influence the public governmental bodies in power to improve the housing conditions. There was general consensus that a group of teachers, identified as such, would have more power in an effort to promote change than single individuals. Some of the enrollees felt that any community action effort should include residents of the Park, since the solutions to the housing problems in many respects depend upon the local residents. In the process of school staff becoming involved in the solution of a community problem, it was felt that the attitude of the families toward the school would improve. It is presumed that parents' positive attitude toward school supports the child as a learner.

Considerable time was spent reviewing the present educational program of Lacey Park School which provides time for a daily free selection period, and is a non-graded, team teaching organization with heavy involvement of volunteers and strong emphasis on a varied parent education program. The relative merits of the characteristics of the program were discussed. It was clear to all that Lacey Park School staff certainly had not achieved the ideal educational program for disadvantaged children; however, through the six years of the project, we have learned a great deal about the special needs of our children, have tried and discarded some ideas, and have now determined the direction that we will take in the future along the same lines of our present organization.

Some of the participants felt that the program developed at Lacey Park would be just as appropriate for middle class children as for the disadvantaged.

Part of the workshop was devoted to small group discussion of the specific children that the teachers would be receiving in September, 1969.

Recommendations and suggestions were made by the workshop participants in an effort to improve the educational program of poor children in our district; not in all cases was there total consensus, since some of the recommendation came out of the small group meetings rather than from the total group.

The recommendation and suggestions developed at the workshop are as follows.

1. The teachers present at the workshop will take responsibility for informing other teachers in their building about the content of the workshop.

2. Due to the presence of a discriminatory attitude toward children from Lacey Park among some of Centennial staff, an in-service program similar to this workshop is recommended for all teachers of Lacey Park children. (This recommendation will be forwared to Mr. Rittenmeyer, chairman of the in-service committee.)

3. Visits to the homes of all Lacey Park elementary children should be made by their teachers each September to introduce themselves and to become acquainted with the children's families and home situation. (The group decided that this should not be a mandatory requirement but a policy encouraged by the administration).

4. In cases where parents cannot come to school for parent-teacher conference, the teacher should visit the home by appointment.

5. Curriculum offerings for the Lacey Park children need to be modified to relate more appropriately to the needs and abilities of the children beyond Lacey Park School; the curriculum standards for the middle-class schools are not appropriate for children of disadvantaged homes.

6. An organization of space and schedule should allow the Lacey Park children more opportunities for movement, freedom to select activities, many enriching experiences away from the school, etc., beyond Lacey Park School.

7. The report card presently used should be re-evaluated and re-worked particularly in the light of the sense of failure created by the present reporting system for so many Lacey Park children. (Participants were urged to forward their ideas for a new report card to Mr. Fliszar, chairman of report card evaluation committee.)

8. Along the same line, we should spend some time studying the effects on elementary teachers of the pressure from the secondary level. The pressure on each successive grade level was also an area of concern for study.

9. At the invitation of the Longstreth teachers in an effort to inform Lacey Park teachers about the program beyond the primary level, Lacey Park teachers should visit Longstreth School while in session.

10. Since the distribution of different colored poker chips for lunch sets the free lunch children so clearly apart from the children who pay for their lunch, new methods need to be devised for making the free lunch available.

11. Conferences at the beginning of every school year should be held between grade level teachers. Teaming would be a good mechanism for implementing this recommendation.

12. Teachers should take advantage of the freedom given each individual in this district to be innovative and creative in developing with adequate justification program and curriculum offerings. (It was generally agreed that teacher initiated programs are most apt to be successful.)

The workshop closed on a happy note when Keith M. Kershner, the Project Coordinator from the State Department of Education, revealed there was a significant difference in the pre-test (Sept. 1968) and post-test (May 1969) scores of the children at all levels in Lacey Park School on six different measures.

One of the most gratifying features of the workshop, to me, was the teachers' commitment to change in the interest of providing the best kind of educational program for children. Their willingness to examine their own attitudes in relation to their children was remarkably open and sincere. Also, it was apparent they saw themselves as a cooperative group who want to continue to work together, not at odds with one another, in an effort to find mutually acceptable solutions to the problems they face. It was clear to me that these teachers consider education to be a process which above all else needs humanizing.

APPENDIX G

TEST-RETEST CORRELATIONS

TABLE 15

TEST-RETEST CORRELATIONS CONDUCTED AT THE URBAN SCHOOL

Measure	n	Test Mean	Retest Mean	r
1. CTMM Total	28	102.89	95.82	.86
2. MRT Total	15	68.40	69.60	.89
3. MAT	10			
Subtest 1		1.74	1.85	.85
Subtest 2		1.76	1.71	.77
Subtest 3		1.59	1.68	.52
Subtest 4		1.71	1.65	.72
4. SMSG Total	29	89.10	92.41	.66
5. OLS Total	28	12.41	13.76	.52

In all cases the intertest interval was two weeks. Testing samples were drawn randomly from the program testing lists. Product moment correlations were performed. Since there is no total score for the MAT, subtest results are reported.